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A CERTAIN ancient regulation of the town of Boston, dating back to the year 1683, has been giving a good deal of trouble recently to some of the architects and lawyers of that city. It seems that in the latter part of the seventeenth century several destructive fires occurred in what was then the colonial village of Boston, and the royal Governor and Council of the Province of Massachusetts Bay enacted a law for "encouragement to build in Boston with bricke and stone," by which it was ordered that "whosoever shall soe build shall have liberty to sette halfe his partition wall in his neighbor's ground, leaving jags in the corner of such wall for his neighbors to adjoyne their building thereto, and when the same shall be built unto, the neighbor adjoyning shall pay halfe the wall soe far as hee shall adjoyne." In 1692, nine years after the original order, the law was reënacted in nearly the same words, constituting, it would seem, a party-wall regulation as definite, though not as comprehensive, as the provisions of the Metropolitan Building Act itself. In the political disturbances of the succeeding century this regulation seems to have been forgotten, and for many years, unless by express agreement, it has been understood that persons building brick walls must keep them upon their own land, or take the consequences of trespassing upon that of their neighbors. Five years ago, however, a real-estate owner in the southern part of the city built a wall, half on his own land and half on the adjoining estate, and soon afterward the neighboring proprietor appropriated and used the side of the wall which belonged to him, but omitted to pay for it, and instead of doing so gave a mortgage deed of the whole estate, declaring it to be free of incumbrance, which was subsequently foreclosed, and the property sold. The original builder of the wall now sues for the value of the half of it used by his neighbor, on the ground that under the ancient statute he was entitled to build half of it on the adjacent estate, and to be paid for it when his neighbor made use of it, without any special agreement to that effect; while the defendant thinks that the regulation in question, being a mere rule of the colonial municipality, which was never adopted as a part of the law of the State of Massachusetts, has long been void, and that the plaintiff, in trespassing upon his neighbor's territory with his masonry, did so at his own risk, and as he gained thereby additional space inside his building, he cannot complain if his neighbor, instead of requiring him to remove his wall, or bringing action for damages, contents himself simply with using the structure which, under the ordinary rules of real-estate law, becomes his by the fact of its having been erected on his land. A similar case was tried some months ago, but we believe that a definite decision has not yet been given. In the present instance, however, the question will be carried at once to the Supreme Court, in order to obtain a final decision upon a matter of great importance to all who own or manage real property, or build structures of any kind, in the metropolis of New England.

WE have received a letter requesting our "private opinion" upon certain matters of construction, and think the occasion a suitable one to say to all other persons who make similar requests, as well as to this particular correspondent, that in our capacity as editors, while we are pleased to answer the inquiries made of us according to the best of our ability, we wish to do so in such a way that all our readers who may happen to be interested in similar matters may see both the question and the answer, and perhaps profit by them. There are, however, cases in which a correspondent, like this one, makes his application in such a way that we cannot publish it without a violation of confidence which may even do him some injury. Such persons must have their difficulties attended to by one of the editors, or some one of the experts to whom they themselves occasionally appeal, in his private capacity, exactly as in the case of any other client, and as this journal cannot assume the charges which these experts would naturally and properly make for their opinion, unless its readers are to receive the benefit of it, it is often necessary to delay the reply until the question can be modified so as to adapt it for publication. If, therefore, any one who desires to make inquiries of us would have, what we always wish to give, a prompt answer, he should frame his question in such a way that we need feel no hesitation in publishing it, and the reply to it, without discussion or amendment.

THE people of Chicago, by their city government, in their haste to abolish the annoyance of overhead electric wires, some time ago passed an ordinance forbidding the placing of any more wires on poles within the city limits. Hitherto, there has seemed to be no other practicable way of carrying them through the streets, but a contract has recently been made between the Chicago Sectional Electric Underground Company and the American Sectional Electric Underground Company of Philadelphia, by which the right of laying in Chicago the perforated terra-cotta tubes which form the subject of the patents owned by the latter is transferred to the former company. The Philadelphia corporation, although controlling what seems to us the most promising form of subterranean conduit yet invented, has not been able to bring it into very extensive use, on account of the determined opposition of the telegraph and other companies to the attempts made to force them to place their wires beneath the surface, but the case seems to be different in Chicago, where it is distinctly understood that no more overhead wires will be tolerated unless the necessity for them is proved. What will be the result of the contest it is impossible to say, but if the Philadelphia tubes are found to answer their purpose, it will not be long before they will be in great demand.

THE bill for incorporating the Nicaragua Canal Company has been reported favorably in Congress, modified, however, by striking out the clause relating to the guaranty by the United States of interest on the capital stock, and substituting another, which provides that the United States may, if it shall seem necessary for national purposes, temporarily occupy and manage the canal, paying the company in return a sum equal to the net earnings of the canal during the year previous to the occupation, with an annual increase, if the occupation should continue for more than one year, proportional to the regular increase of business in the period just antecedent to the occupation, but with the restriction that the annual payment shall in no case exceed the sum necessary to enable the company to meet its obligations and pay a dividend of ten per cent upon its capital stock, after reserving a surplus for repairs amounting to five per cent of the total sum paid. Nothing, apparently, could be fairer than this proposition, and the promoters of the canal are probably right in thinking that the act of incorporation will be easily secured. Some opposition may be expected from the representatives of the Tehuantepec Ship-Railway Company, and the Panama Company, but the Nicaragua Canal has the advantage of being an American scheme, supported by a large number of persons of high standing and reputation, without having the element of uncertain experiment which has done so much to injure the prospects of Captain Eads's company. In regard to the latter's undertaking it is a little remarkable that a story has been published to the effect that a project for a ship-railway, identical with that of Captain Eads, was described in a pamphlet published some ten or twelve years ago by a French engineer, who now appears in defence of the plan, which he still considers perfectly practicable, although he thinks that his name ought to be substituted for that of his St. Louis rival as the author of it.

A BUILDING surveyor has written to *La Semaine des Constructeurs*, to ask the opinion of the editor upon a dispute in which he finds himself engaged. It seems that he was engaged by a contractor for mason-work to measure a number of buildings, and after fulfilling a portion of his task sent his employer a request for a payment of one thousand francs on account. After a long delay, he received five hundred francs, instead of the thousand that he asked for, and meeting the contractor subsequently with another surveyor he concluded that he had been superseded in his employer's favor. He had still about a dozen surveys to make, but finding that he was likely to have no further employment, he resolved to secure payment of the money for his present services, and notified the contractor that the surveys in his hands would not be completed until he was paid for them. By this sort of persuasion he obtained a thousand francs more, which nearly paid his bill for the work done, but left him with surveys to be completed for which his fees would be about fifteen hundred francs. At this point the contractor undertook to emulate the summary proceedings by which he had himself been brought to terms, and made a sudden demand upon the surveyor for ten thousand francs as damages for the delay in finishing the work entrusted to him. The question was brought before the local tribunal, which appointed an expert to decide whether any damage had been suffered by the contractor, and ordered the surveyor meanwhile to complete at once three of the most important measurements in his care. This order was complied with, but the surveyor, still believing himself right in refusing to deliver them until paid for, desired to know the editor's advice. This was, in brief, that the surveyor was bound to complete his contract with the builder within a reasonable time, if no definite time was fixed; and that he would certainly be responsible for the damage which his refusal to do so might inflict upon his employer. If, however, the contractor refused or neglected to make proper payments for the work done for him, the surveyor might decline to proceed further with his work, and such an abandonment of his agreement would be justifiable, provided the builder was not injured thereby.

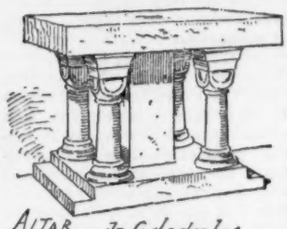
A PAPER was read not long ago before the Conservatoire des Arts et Métiers at Paris, containing a description of some of M. Pasteur's remarkable investigations into the nature of infectious diseases, which seems to have been of great interest. Every one remembers Pasteur's great services in the study of the silk-worm disease, and his subsequent discovery of the microscopic *bacillus anthracis*, which he proved by repeated trials to be the agent, both of infection and death, in the disease known as anthrax, or malignant pustule, or, as the French call it, charbon, which destroys great numbers of sheep every season, and occasionally appears as an epidemic of frightful virulence among human beings. To make sure that he had succeeded in detecting the true agent of infection, M. Pasteur took from animals dying of the disease small portions of the blood, which in fatal cases always swarms with the animalculæ, and inoculated healthy sheep with minute quantities of the dried liquid. In every case the inoculated animals were attacked, after the usual period of incubation, with the same disease, and died, their blood communicating again the infection to others with unabated violence. To ascertain whether the bacilli, rather than any other constituent of the blood, formed the real agent of the disease, M. Pasteur next prepared an artificial liquid from various nutritious substances, and placing a drop of infected blood in this succeeded in inducing the vigorous multiplication of the few bacilli contained in the blood, until the whole of the artificial liquid was filled with them; a colony of these, transplanted into new portions of the same liquid, again reproduced themselves, and on inoculating fresh animals with portions of the last liquid, which had never been associated with any animal body, and was perfectly innocuous in its character, except for the animalculæ which it contained, he found that as before, fatal infection with the original disease was the immediate result.

ONE further step was necessary. It was claimed by some critics that the liquid, not the living germs contained in it, was the active poison, and to determine this point, M. Pasteur filtered portions of it through plates of plaster of Paris, which separated the animalculæ, leaving them on the surface, while the fluid portion ran through. On inoculating new subjects, part with the filtered liquid, and part with the residue left on the plaster plate, it was found that all those treated with the latter died, while none of those inoculated with the filtered liquor suffered any evil effect. The identity of the bacillus, a small, quiescent, rod-like organism, with the fatal infection being now established, M. Pasteur next inoculated birds, but found that that they were unaffected by it, and in endeavoring to account for this exemption it occurred to him that the high temperature of their blood, as compared with that of the mammalia, might be unfavorable to the development of bacillus. He therefore inoculated a fowl, and putting it immediately afterward in a cold place, so as to reduce its temperature to about 98° Fahrenheit, the blood-heat of the mammalia, it died. Another fowl was cooled to the same temperature and inoculated. It sickened, but on being removed to a warm room, where its blood could regain its natural heat, of about 110°, it recovered. A frog, a cold-blooded animal, was next inoculated, without effect, but another, placed after inoculation in a warm room, so as to raise its temperature, died. These experiments were repeated until no doubt was left of the correctness of the principle which they involved, that the anthrax bacilli were noxious only within a certain limited range of temperature, and that when kept in temperatures above or below this range they were inactive. This discovery soon led to another, that inoculation with the infectious germs, rendered partially inactive by a temperature unfavorable to their development, rendered the subject of the inoculation insensible afterwards to germs of the same kind, even in their fullest activity, or in other words, that vaccination with the anthrax poison, rendered artificially inactive by regulated temperature, protected the subject against the original disease in exactly the same way that vaccination with the cow-pox virus protects us against danger from small-pox. To test on a convincing scale the conclusion to which his experiments had led him, M. Pasteur procured sixty sheep, which were divided into three flocks. One of these, containing ten sheep, was set aside, simply as examples of the condition of the others before treatment. Twenty-five sheep, forming the second flock, were twice vaccinated with the modified anthrax virus, one operation taking place two weeks after the other. A month after the last vaccination, the sheep of this second flock, together with twenty-five in the third flock, which had not yet been touched, were inoculated with the virus in its full force, and after the usual period every one of the unvaccinated animals died, while the twenty-five vaccinated ones escaped unharmed. So striking was this demonstration of his theory that a veterinary surgeon demanded immediately of M. Pasteur to be vaccinated with the anthrax. Since that time, M. Pasteur has devoted himself to the study of other forms of infection, and is said to have already discovered the specific poison, as well as the modified virus for protective vaccination, of the typhoid fever of horses, the cholera of fowls, and a disease of pigs. We have before mentioned that the specific poison of pulmonary consumption, now reckoned among the infectious diseases, is thought to have been isolated, and that protective vaccination against this dreadful disease is likely to be successfully attempted before many years, and if this, the most fatal of all known diseases, together with the anthrax, a malady which, if not common, is so virulently infectious that the germs of it, brought up, as M. Pasteur found, by earth-worms from a corpse which had been buried deep in the ground for twelve years, formed a focus of new disease, can be guarded against with as much certainty as small-pox now is, it can hardly be long before similar barriers will be raised against the other contagious maladies which now do so much to shorten the average period of life, and so much more to render that period unhappy and ineffective.

A NEW kind of finish-nail has been introduced in Germany, which appears to the editor of the *Deutsche Bauzeitung* to be in certain respects superior to anything yet invented. Like the other finish-nails used abroad, the new variety is made of wire, but instead of being round, the section of the wire is an equilateral triangle, with concave sides. The stiffness of the nail is much increased by the angular form of its section, and a reduction of twenty-five or thirty per cent in weight can be made without injury to the strength. Moreover, as the surface of the prismatic nail is much greater than that of a cylindrical one of the same strength, its friction in the wood, and consequently its resistance to a force tending to draw it out, are correspondingly multiplied.

FROM BAYREUTH TO RATISBON. — NOTES OF A HASTY TRIP.[1] — III.

Early Romanesque.



ALTAR in the Cathedral at RATISBON. Germany.

LITTLE more than an hour in the train took us the next stage on our journey — from Bayreuth to Bamberg. But no change could have been more complete. When we looked out of our window in the morning this change was not, indeed, at first apparent. We looked on the "Vegetable Market," or *Gruene Markt* — a crescent-shaped place, hardly more than a wide street. The houses were chiefly of the seventeenth century, similar to those we had left behind in Bayreuth, and a large ugly Jesuit church rose near at hand. Not a spire was in sight, nothing to show that we were in one of the great strongholds of Romanesque architecture; but a walk about the city, while it gave us the same seventeenth-century elements in abundance, showed also those of almost every earlier date. Although Bamberg was never, even in its greatest days, a first-class German city, it stood high among those of secondary importance, the home of powerful and art-loving prelates. Each age has left a more or less palpable impression on the town. We are not, as in Bayreuth, in an almost homogeneous city, but of course, the great Romanesque epoch stands out more prominently than all others put together, and absorbs all the architectural renown of Bamberg. There are some interesting Rococo buildings, notably near the bridge. The *Baroque* churches are not worse than in other places. There is good Gothic, and good Renaissance work, as will be noted later on, and there is a profusion of Romanesque buildings amid which the Cathedral stands as not only the centre of all interest, but is so preëminent that one must grudge, while in Bamberg, the time spent on anything else, and, in recollection, the words that should in justice be given to other things. It is peculiarly situated — on the top of a steep hill, but so shut in by other eminences and its base so built about by other buildings that it is not visible from the streets of the town, and does not dominate it far and wide, as is usually the case with churches similarly set on high. The streets through which we approach it are narrow and winding, and it is only when we reach the very foot of the hill that we catch sight of the noble structure. The houses on this side, the eastern, are all at lower levels, at the foot or on the slope of the elevation, but still they conceal the church till one is almost below its foundations. So steep is the hill that steps as well as inclines are used to mount it. When the summit is reached we find ourselves in an open square, the eastern side edged with a fine Renaissance balustrade over which we look down directly on the roofs below. To our right as we turn and face the cathedral front is a long, monotonous palace-structure, apparently of the end of the seventeenth century. I forgot to ascertain its date for it was quite uninteresting; but across the square from it, to the spectator's right and flanking the cathedral itself, is what is called *die alte Hofhaltung* or Old Palace, built about 1580 — with a high gable-end toward the square, and near it, giving access through a low wall, an elaborate portal with profuse figure-decoration in high relief — a most interesting example of German Renaissance work in its least classic and most picturesque temper.

This building is separated from the cathedral by a wide interval, so that not only the eastern front of the latter but its northern side are quite free and may be seen to excellent advantage. The west front, on the other hand, one can only study from quite near at hand, and the southern side cannot be approached save through private gardens and a crowd of little houses; but as the east and north aspects are chief in importance the partial concealment of the others does not so greatly matter. The ground slopes rather steeply from the east toward the west end of the church, so that while the foundations of the latter are at the level of the pavement, the eastern apse rises from a high terrace, on either side of which a broad flight of steps leads to the two eastern doors. This fact, combined with the general elevation of the site, is peculiarly favorable to the effect of the splendid building. One's first thought is of delighted astonishment at its excellent preservation. Of course the massive, simple work of this period is always better preserved than one may expect who is more used to the fragility of Gothic. I had not seen any of the great churches of the style, however, — neither Speyer, nor Worms, nor Bonn, — and in comparison with the dilapidation of even the best preserved Gothic, still more in comparison with the front of such a church as the Cathedral at Rouen, for example, which looks like half-melted ice, the almost intact beauty of this earlier building was, if rationally to be expected, none the less a surprise when seen.

I suppose each student of architecture, even of the most superficial sort like myself, has a secret preference for some one style — sunk from memory in the desire for catholicity, disappearing temporarily in the unfeigned delight produced by the sight of a good building of any age, but reappearing in full force in the presence of an actual work of the favorite period. For myself I may say, lest my delight in this church should lead to disappointment in some future pilgrim's mind, that I had always had a penchant for German Romanesque, a feeling that however beautiful and adorable any Gothic building might be, here was a sturdier, nobler style, — a style uniting much of the repose, simplicity and unity we are apt to call "classic," with much of the "romantic" beauty found to a fuller degree in Pointed work. Seeing how well this church had weathered the centuries, when a lesser number had reduced so many of its Pointed brethren to all but dust and ashes, I felt my preference supported by one argument at least. If the building itself did not strike one as perfect, the *style* seemed capable of infinite perfection — capable of hitting the exact medium between massiveness and lightness, between mere strength as such and mere beauty as such. I am speaking now of external effect only. Whatever may be the case with interior construction, one sight of Bamberg confirmed my old idea that in exterior work this was the style that should by rights have been the greatest of modern times. It is Mr. Freeman, if I do not err, who regrets so often and so bitterly that the invading French Pointed killed the German round-arched style, and prevented the nation from developing its architecture in a truly national and individual fashion. That the style at the time of this invasion was fully developed no one can assert, but that it was capable of further progress in its own individual path no one can question. It is not to be supposed that the exigencies of internal construction would have been satisfied with round arches forever; — even here they are partially superseded — but that the introduction of the pointed arch need have been followed by the extinction of all the chief features of the earlier work does not seem evident. In the west towers of this church we see the pointed arch triumphant, but with no loss of Romanesque effect or feeling. And seeing them one imagines that had the style thus developed without foreign help — or hindrance — we should have had something, not better, very likely, than the best French Pointed, but as good in a fresh and different and more nationally characteristic way, — and perhaps a style in which exterior solidity would not have been so sacrificed to interior beauty. It may seem impossible to us that the two things could ever have been united in perfection — the aspiring grace of a good Pointed interior with the satisfying solidity and logical impressiveness of a Romanesque exterior. No one will now attempt, of course, to say how it could have been done; yet, looking at such a church as this, one believes the children of its builders might have found the way. Of course, without the all-embracing later windows we should be without our glass, but I cannot help thinking that even the beauty of the later glass is dearly purchased by the comparative imperfection of a late Gothic apse as seen from the outside.

The reader has a dozen treatises to turn to if he wishes a description of this church. I could not portray it properly even if it had not so often been described. I will only say that no description, no illustration can give an idea of the impressiveness of such work — of its restful, satisfying solidity which is not heaviness in the least, of the delicate decoration which so perfectly holds its subordinate place, never attracting the eye from more important qualities. An impression of unity is conveyed which is rarely felt, I think, in looking at later work. One sees the façade as a whole, — as a building, so to say, — not as an assemblage, however beautiful, of doors and windows and decorative details.

The foreign visitor to Bamberg, who is not very well up in his German history, will doubtless be confused by the names of the local benefactors. One among them is the "Heilige Otto," who must not be confounded with the Emperors of that name, but who was a bishop put in charge of the see by Henry the Fourth, in 1102. He and the Emperor, Henry the Second, with his wife, the Holy Kunigunde, are, so to speak, the patron saints of Bamberg. The latter, in the year 1004, established here, in what had hitherto been an unbroken wilderness, the city and see of Bamberg, as a centre from which Christianity and civilization might be preached to the neighboring Sclavonic tribes. The earliest cathedral was dedicated in her presence in 1012. All the nobles of the land were assembled, we are told, together with forty-five archbishops and bishops, and a Papal legate specially despatched. This church has entirely disappeared, in consequence of a great fire in 1081 and of subsequent rebuildings. All that is known about its character is that it was probably built by a Saxon architect, whom Henry is known to have employed on other buildings in the city; that it was a three-aisled basilica; and that the distinctively German feature of a western, as well as an eastern, apse was introduced. The Emperor filled it with gifts and relics, many of which may still be seen in Bamberg.

The church was rebuilt by Otto der Heilige after the conflagration of 1081. It does not seem to have been entirely destroyed, for we are told that he relaid the pavement, covered the remaining columns with plaster, renewed the frescoes which had decorated the walls, and built a new roof which, together with the tower, he sheathed with gilded copper to prevent a similar disaster in the future; but he entirely rebuilt the *Georgenchor* or eastern end, and the crypt below the present choir, though redecorated since his day, probably remains from this period; for, of course it is not Otto's building, any more than Henry's, that we see to-day. What happened to the structure of the end of the eleventh century we do not know; but by the end of the thirteenth it had assumed an entirely new shape — having grown from the primitive flat-roofed basilica into this splendid late-Romanesque structure, with its pointed vaulting. Contemporary chronicles are exceptionally scanty with regard to this church, but we are told that part of the building was reconsecrated in 1237, and that fresh alterations were begun in 1274 — between which dates the

[1] See *American Architect* for November 11, 1882.

pointed arch had already grown in favor, even for external decorative work.

At the earlier date the east end of the church, the *Georgenchor*, received its present shape. The foundations of the towers, the nave, walls and windows, and the northernmost portal of the east end were probably preserved from the earlier building. To the end of the century belongs the western or *Peterschor*, with its towers and the adjoining transept. One cannot regret, looking at the building in its present shape — as one so often regrets a similar fact in other churches — that an interval of forty years separates the newer from the earlier portions. There is no discord between the two, no feeling that two separate, if allied styles, have been patched together. As I have already said, the first impression given is of complete, though not monotonous, unity. We feel that the style has not changed but grown. There is no abruptness of transition, no lack of connection. The eastern towers are comparatively plain, and their openings are round-arched; the western are much lighter, much more lavishly decorated, with open projecting bays of clustered columns at each angle and with pointed arches throughout; but they group together, whether seen from far or near, in the most perfect harmony. The effect is as homogeneous as though all four had been of the same date, and more beautiful by far than if all had been alike. As I have already confessed, I have never seen either of Bamberg's great rivals, but I cannot believe, so far as one can judge from their pictured aspect, that either of them, though so surpassing the Franconian church in size, can equal it in harmony of proportion and effect. The group of four lofty spires, in two contrasted yet harmonious pairs, so well proportioned to the extent of the simple, logical structure above which they rise, must, it seems to me, be more beautiful than either the four low towers and two still lower octagons which crown the immense extent of roof at Speyer, or the great lantern of Mainz, patched up by later builders and accompanied by insignificant little towers. The eastern end of Bonn is much like that of Bamberg, but the ground plan results in a much less harmonious effect; the western end is Gothic with flying buttresses, which sadly disturb the Romanesque feeling of the rest; and the great central spire seems as much too large for the building as do the towers of Speyer too small. Look at your Lübke, dear reader, and see if I am not right, though I am sustaining the cause of a smaller church against its more famous rivals.

This church has, moreover, quite an especial claim to interest on account of the beauty and profusion and good preservation of the sculpture with which it is adorned. Franconia was distinguished above all Germany, perhaps, and Bamberg above all Franconia, for its sculptured work. Under Henry II a flourishing school had already sprung to life, but between about 1100 and 1260 was the great epoch of the art. To this period belongs the doorway in the east end, already referred to, which leads from the north aisle. Though the portal itself may be, as has been suggested, a survival of Otto's building, its decorations are of this later period. They include a relief in the tympanum which shows the Virgin and child on a throne, and between the side columns life-size statues of St. Peter, Henry and Kunigunde, and the Holy Otto. The great north door of the church is still later and much more elaborate, one of the very finest extant specimens of the German school of sculpture. The tympanum shows the Last Judgment most elaborately treated, with hundreds of figures and immense dramatic force. The statues which fill the niches between the flanking pillars of the doorway are all connected with the main scene. A strongly peculiar type of form and face, and a curious half-laughing expression which is found on almost every countenance — even on the faces of the damned, struggling through the agony which is expressed as well — mark this work as the creation of some sculptor who, though nameless now, was none the less an artist of great individuality and power. Even more interesting are two large statues which, standing on columns, flank the portal on either side. These, which may be seen duplicated in many museums of German antiquities, are said to represent the Church and the Synagogue — the Mother of the Faithful and the Mother of the Lost. The former is not very peculiar in conception, but the latter is, so far as I have seen, a unique figure in the art of the time — a woman with bandaged eyes, holding a broken standard and dropping from her nerveless hand the tables of the law. Both figures are extremely long, slender and willowy — with a delicate, languid and almost affected grace, such as we do not very often find in German sculpture of any period.

M. G. van Rensselaer.

The Rolling Bridge at St. Malo, France.—The old town of St. Malo, in the department of France called Ile et Vilaine, is built upon a small, rocky island, which communicates with the mainland by a causeway artificially constructed. The town covers the whole island, and is of no little importance as a centre of trade and seaport. One of the curiosities of the place, but quite a modern affair, is the rolling bridge, which runs between St. Malo and St. Servan. Rails have been laid upon the ground, which is visible at low water, and over them roll the wheels of the great iron skeleton which supports the platform of the bridge. The movement is by traction, a small steam-engine on one side of the harbor working a cable attached to the frame of the bridge. The tide rises very high at St. Malo, so that when it is up but little of the bridge's support or carriage can be seen, and its rapid movement, when gliding across the channel with its load of human and other freight, and that without any visible agency of propulsion, seems odd enough to the stranger.— *Exchange.*

ART IN PHILADELPHIA.

In certain very important respects the artist's life in Philadelphia is not the happiest one conceivable. Perhaps the public is not very responsive or enthusiastic, and there is in general a lack of that atmosphere which is usually regarded as the one thing necessary to artistic success, and of which certain other cities that could be named are so proud. But there is certainly no lack of such evidence of activity as is furnished by good exhibitions and plenty of them. The Academy's exhibition is followed at a short interval by that of the Society of Artists, at their galleries on Chestnut Street, and the walls of the Academy itself are occupied at the same time by the admirable display of the Society of Etchers.

Neither of these is very well patronized, it is true, either in the matter of admissions or that of sales, and both have doubtless to be carried on at considerable pecuniary loss to somebody. But this state of things is by no means peculiar to Philadelphia; even in Boston I always noticed that somehow the crowds only came on free days. It is probably a part of the plan by which Art advances on the arm of Philanthropy — by which its progress has come to be a "movement," and its teachings a "gospel."

Whatever the merits of the questions at issue that have led to the separation between the Society of Artists and the Academy, it is certain that the Society has shown a good deal of pluck and seems to have enlisted a good deal of sympathy among members of the profession throughout the country: enough to make the current exhibition not only a very attractive one in its general effect, but one that is really representative of many of the best tendencies of American art.

We all admire this enterprising and plucky spirit, of course; but for one, I do not believe there is any real need of the maintenance of the separate galleries by the Society, and I cannot help feeling that it is a great pity that so much good money, and good management, and good feeling should be expended in an enterprise for which the public seems to care so little, and by which I am afraid the profession is not benefited in any important particular.

The Academy officials have made mistakes, I presume, — as, Heaven be merciful to us all, who has not? but it would be very strange if any differences existed that reasonable men could not adjust in a little time, if they went about it in a proper way; for, after all, it isn't as if the Academy here meant a lot of Academicians, ready to appropriate all the good places on the walls at an exhibition, to banish to the limbo of the corridors and stairways, or even to reject altogether, work more meritorious than their own. Such complaints, the standing grievances against academical organizations elsewhere, have never been made here, because our Institution, with its magnificent building and the prestige which its record and the influence of its managers — to say nothing of its income — give, yet presents the delightful anomaly, by which may it ever be distinguished, of an academy without academicians.

Such differences as exist seem to be due only to the mutual incompatibility which unfortunately exists between members of the profession and organized patronage almost everywhere, and while sympathizing with the artists on general principles, I really hope there is not sufficient ground for complaint against the Academy to warrant a continuance, much longer, of the unfriendly division of forces that exists at present.

Meantime the public is, perhaps, considerably a gainer by the activity which nothing develops so well as a little controversy and by the friction which brightens up both parties.

The size of the Society's rooms precludes the exhibition of any very large canvasses, so that these go to the Academy any way; but then so few men find any inducement to paint what are commonly, and with something like a sneer, called "exhibition pictures," that probably very little work has to be sent away on account of its size. Be this as it may, the absence of any very large pictures gives a compactness, perhaps I might be allowed to say, a cosiness to the general effect of the display that is about the first thing to strike the visitor as characteristic of this exhibition, as it was of the one last year. But this is partly due to the hanging too, which, it is to be observed, is first-rate throughout.

The limit of size is reached in Mr. F. D. Millet's portrait of Lawrence Barrett as Cassius; a very good picture, a little frigid, perhaps, but very true to the original and a piece of thoroughly good, if somewhat student-like, painting.

Most conspicuous for its technical merits, as well as for the commanding place which has been given to it on the walls, is Mr. Thomas Hovenden's "Elaine." I am afraid my praise of it will be tempered with so many reservations as to make it seem like something else; but it is certainly praise, and not blame, that I wish to give.

It is easy enough to say it is theatrical, and it *is* theatrical, I own,

not only in the costumes and accessories, but, with a few exceptions, in the characters who are figured and the way they are disposed. If I were to select any one for special complaint it would be the king, who stands by the head of the bier with the letter in his hands which he has just read to the knights and ladies assembled in his hall. Tennyson has managed, throughout, to make us respect the heroism of Arthur, however much he emphasized in him the gentlest virtues; but I am afraid, in Mr. Hovenden's Arthur, the line has been passed which separates gentleness from pusillanimity.

If there were in the poem, to which there is evidently a wish to be faithful, the slightest warrant for his absence I should certainly say there was no Lancelot present. Now if we could be quite sure that this was the case there would be no fault to find with it, but unfortunately we are forced to believe that one of these half-haggard, half-sanctimonious-looking robbers is meant for him. But when we have found what fault we can with the picture let us look at its beauties; they are well worth our close attention. Faults or not, it is an impressive and beautiful work. With the exception of the trace of stage traditions in the grouping of the figures, to which allusion has been made, and perhaps, of the weeping woman, whose grief seems to be more demonstrative than there is any need of, and whose bowed-down figure makes, as I cannot help thinking, an awkward line in the picture — the composition is first-rate. The drawing is admirable, and the color, rich almost to gorgeousness, is wonderfully subtle and sweet. Of these, and of the way in which the figures which are given most prominence are studied — the dead girl, the queen, and the very beautiful female figure in the foreground only the most unreserved praise is to be spoken.

Such pictures are painted under discouragements enough in these days of slender themes and the tyrrany of the commonplace. There is something almost heroic in the attempt, on the part of so strong a painter, to treat so a romantic a subject as this.

The less ambitious, and consequently, more popular work which Mr. Hovenden has contributed is such as to entitle him to the very first place, even if the "Elaine" had not been sent. He has made his home in a delightful suburb near by, and is claimed by the Philadelphia fraternity as one of themselves. He is, as our friends in Third Street would say, the "feature" of the present exhibition.

Mr. Blashfield's "Music" is so much more interesting than anything he has shown here before that one is encouraged to hope that he is outgrowing the brutalizing influences of the school in which he was trained, and which have sadly marred his most important work hitherto exhibited.

Mr. C. Y. Turner has, I think, done nothing so good as his "The Days that are no more" which is exhibited here. It is exquisite in tone; the color though very subdued is very sweet; and the composition full of dignity and grace.

The "Silenced" of Mr. Gilbert Gaul seems to me to come nearer being a worthy contribution to the pictorial record of the civil war than anything that has yet been painted. It is not too much of a subject, and its ghastliness is subdued, not denied, in the treatment it has received. It is night, and the uncertainty of the outlines and the tenderness of the light make the horror bearable, and even touch the scene with a kind of beauty; it is just terrible enough to invite the artist. I question whether he has any business with the hideousness of a real battle, but a little episode like this, and by moonlight, — perhaps we can allow him so much.

If I were to select all the other good works, and try to say something about every one, I should begin with Benoni Irwin's "A Stitch in Time saves Nine," which is a clever picture with a well-worn, but still interesting subject. It is not my purpose to do anything of the kind, however. Readers of the *American Architect* would hardly be interested in the enumeration; besides, I shouldn't know where to leave off.

As a Bostonian, I may be allowed to express regret that Boston art is not better represented, not only in this, but in the Philadelphia exhibitions generally. Mr. Picknell's "Sand-Digging," his "After a Storm," and his two studies of down-east fishermen are among the most genuine successes of the collection, but these are all that Boston has sent, except J. Appleton Brown's "Old Mill, Byefield," which, though a very good picture, indeed, yet does not show very much of those peculiar excellencies which are regarded as chiefly characteristic of his work at home.

The exhibition of etchings at the Academy has all the elements of success except an appreciative public. The exhibition itself is magnificent and, thanks to the superb collection of Mr. Claghorn, which embraces about everything worth having, and upon which the Society has drawn for some six hundred examples of work by contemporary European etchers, is reasonably complete as an exposition of what the art is capable of as practised to-day. It is perhaps to be regretted that in so important a special exhibition, which is not likely to be repeated very soon, the old masters were not included too, even if some of the moderns had been restricted to less than the thirty examples which are allowed them here.

Mr. Haden was received with all the kindness for which Philadelphia is renowned, but his audiences were not enthusiastic, and I am afraid he did not teach them much about an art which he practises so well, nor show them any good reason why the proverb about the shoemaker and his last should not be trusted still.

L. W. MILLER.

THE DWELLERS IN CLIFFS.

THE archæological and ethnological explorations in the Southwestern territory have been continued with success under the direction of Professor Powell, during the season which has just ended.

The wisdom of Congress in making provision for this work three or four years ago is becoming strikingly apparent as the railroads extend their lines into this, the most interesting region to the archæologist within the borders of the Republic. Private collectors and specimen hunters are now over-running the places which are thus made accessible, and all that remains of scientific interest which is movable becomes their spoil. The already abundant collection of specimens in possession of the National Museum will become priceless as the opportunity for their duplication passes away.

Some criticism has been passed upon the policy of adding to the store of specimens material of the character of that already on hand; but this policy is adopted in order to have the material for exchange with other scientific institutions. After filling its own reserve collection with the most perfect of the specimens, the remaining stores will be arranged in sets, complete or fractional, to be given to the museums and educational institutions in this country, or sent abroad to be exchanged for specimens from other lands which are obtainable only in exchange; as scientific institutions will not usually dispose even of duplicates for money. There yet remains, however, a great field of exploration, which has not yet been entered upon, and which is still too remote from any of the present lines of public travel to be in danger of early invasion by the tourist and amateur relic-hunter. The incompleteness of the work of the exploration may be inferred from the fact that many of the ancient cliff-villages seen by exploring parties during the last three months were merely sketched from the distance. They appeared to be in a remarkable state of preservation, but were not even visited. These villages, so far as could be learned from Indian guides, were never before looked upon by the eye of civilized man. They were inaccessible by any means at the command of the explorers, who of course will not rest satisfied until in some future trip they have reached them and carried away their treasures. The collections made from New Mexico and Arizona already number somewhere between twenty-five and thirty-five thousand specimens of pottery, stone implements, weapons of war, articles of husbandry, musical instruments, and a thousand-and-one things which appertain to and illustrate the daily life of the people who made and used them. Two parties especially charged with the branch of scientific work referred to were sent into New Mexico and Arizona last summer. One, in charge of Mr. Victor Mindeliff, went to the Moqui country in northwestern Arizona to make surveys of the Indian villages and ruins to be found in the region known as the Province of Tusayon. Their work was confined chiefly to the seven inhabited pueblos, which are situated on lofty mesas, or table lands. Complete surveys in minute detail were made of each village, from which models will be constructed sufficiently large to show every feature of interest. From all except one, large collections of household and other articles were obtained. Mr. Mindeliff is the gentleman who last year made a survey of the Zuñi Village, from which the frame model now on exhibition in the National Museum was constructed.

The other party, under the direction of James Stevenson, has recently returned. It took for its field of exploration the cliff-villages and ruins in the Cañon de Chelly and its branches. The main cañon has very rarely been visited by white men, and its branches — some of which are equal to it in extent, in grandeur of scenery and scientific interest — have, it is believed, never before been explored. In fact, only one of them was examined with any degree of thoroughness on this occasion. This branch cañon was named by the explorers the Cañon del Muerte from the fact that herein were found skeletons of some of the ancient cave-dwellers, probably the first which have been unearthed. A series of water-color drawings was made by A. G. Gustin, the artist of the Stevenson party, illustrating the scenery and the relics of the cañon. They convey an idea which cannot be translated into words, of this remarkable place and its contents. The precipitous brick-red cliffs, a thousand feet high, have been carved by the elements into almost every conceivable shape, while the stratification — now regular and level and again distorted as if by an early convulsion—shows in grotesque pictures upon the face of the rock.

The "nests" (no other word is so expressive for the purpose) of the old dwellers herein were built, like those of wasps, in crevices of the cliff. The places selected were too shallow from front to rear to be properly termed caves. They were probably formed by the swirls and eddies of the torrent, ages ago, before it had cut its way down to its present bed, hundreds of feet below. The solid upper crust is left intact, and forms a lofty, sloping roof over a whole vil-

lage. What could have been the character and habits of life of generations born and brought up amid such surroundings, with a sky of dull red rock overhead, with the outer world possibly narrowed to the limits between the two walls of the cañon, and even that outer world inaccessible except by a perilous feat of climbing, such as none but expert gymnasts of this day would care to attempt; a little world upon which the sun could only shine during two or three hours of its daily round? It is to answer these questions as well as may be that the explorers were sent out.

Colonel Stevenson was led to the selection of the Cañon del Muerte, in preference to others which branched off from the main cañon, upon either side, by the representations of his chief Indian guide, who said that ruins of a more interesting character than elsewhere were to be found there. The party entered the mouth of the cañon, and went a day's journey along its bottom until they reached a place beyond which their wagons could not go, and here they established their camp. The walls of the cañon were of nearly uniform height, about one thousand or twelve hundred feet from top to base, always perpendicular, except where great piles of débris, broken from the cliffs, had filled up a portion of the space below; now approaching each other, narrowing the cañon to a mere crevice in the earth less than a hundred feet in width, and again spreading out half a mile apart.

Proceeding on foot three miles beyond the camp, the explorers found the ruins of a cliff-village, so well preserved and remarkable that it more than fulfilled the promises of the guide. The place must have been the home of between two and three thousand human beings. It occupied two "caves" under the same roof, but partially separated by a projection of rock. The extremes of the habitable floor were 1,500 feet apart, while the width from the rear wall of the cave to the edge of the precipice below might have been one-twelfth that distance. The floor of the two wider portions of the cave was studded thick with dwellings built of square stones laid in mortar, all of which were in a state of ruin. An edifice of grander proportions, and almost as well preserved as in the day of its occupation, nearly filled up the narrow space in front of the dividing rock projection to the edge of the precipice.

It would seem from its appearance in the drawings to have been designed for a fortress, though an examination of its interior showed signs of constant habitation, even the finger-marks of little hands and other evidences of the presence of children remaining. The place was upon the face of the eastern cliff, and was accessible at one point only where an accumulation of rocky débris formed a steep sloping ascent from the bed of the stream 300 feet below. That this pile had not existed at the time the village was inhabited was proved by the fact that among pieces of broken rocks were found the remains of buildings which had been undermined and fallen away. Probably access to the place was had only by means of footholds cut in the face of the cliff from below. It is inconceivable that any one should ever have made an entrance to the village from above. The sun, which only became visible from the bottom of the cañon at eleven o'clock in the morning, did not shine upon this village until two o'clock in the afternoon, and three hours later sank out of sight below the crest of the western cliff.

The fortress-like structure referred to consisted of a long, narrow building one story in height, divided into many rooms or dwellings, opening into each other, but having no communication with the outside except through the towers which stood at either end. The largest of these towers — that at the southern end — was three stories in height, with the joists for each of the upper floors projecting two or three feet beyond the outer walls. Holes through the floors formed the means of communication between the different stories, while window-like openings from the second story of the towers, looking out upon the roof of the connecting one-story structure, formed the only mode of exit from the fortress, if such it was. An inhabitant of one of the central apartments of this building wishing to emerge to daylight and pure atmosphere, must have been compelled to pass through the bedrooms and kitchens of all his fellow-tenants upon one side into the tower; then to climb up through the ceiling to the second story of the tower, swing himself by a wooden bar which still remains in place, out of one of the windows upon the roof of his own dwelling, and thence pass by a ladder down to the floor of the cave — the "street" of the village.

If his duty or pleasure led him to a greater distance, he still had the perilous journey before him down the rock ladder, three hundred feet, to the bottom of the cañon.

Many interesting architectural designs were noted by the explorers which cannot be described here. No evidence of the use or knowledge of metals was found; stone implements fashioned all the materials out of which the structure was built, of which fact the rough but careful chiselling of the stone gave abundant evidence. Cross pieces were laid upon the joists for the flooring of the towers, and upon these pieces twigs about the diameter of a man's finger were arranged side by side, but in series which formed a curious mosaic of angles and squares. In the larger division of the cave, and in the smaller division, one of the curious circular structures which might have been the places of worship or perhaps of amusement, of the cave-dwellers, was found.

The structures are common enough in that section of the country, but these were different in many respects from any before examined by the members of the party, and especially different in their interior ornamentation, which was quite elaborate. In one of them a wide band, laid on in bright durable colors, ran entirely around the structure, resembling a Greek fret, with narrower bands above and below, and with the interior spaces filled with curious artistic designs, the meaning of which none of the party could guess. Evidence of the long use of these places for some purpose was found in the fact that some seventy or eighty different thin layers of mud had been plastered upon the interior, each having in its time borne its own ornamentation in colors. The roofs of the buildings were gone and the floors were covered with débris.

It was at this village that the discovery of skeletons was made. J. Stanley Brown, who accompanied Colonel Stevenson, was one morning climbing over a portion of the ruins which had not before been visited, and observed some small round poles projecting from the face of the bluff, to which fact he called attention. By scraping away the débris, human skulls were reached, and further efforts disclosed entire skeletons. A regular burial-place of the ancients had here been broken into; two complete skeletons with parts of two others were found. Great care had evidently been taken to place the bodies away in the manner best calculated to insure their preservation. The place of their interment was in shape like a large oval baking-oven, and the desiccated remains, in sitting posture with knees and chin touching, had been placed within. The contents of the tomb were carefully exhumed and are now on their road to the Museum. Hair of a brownish hue, which may, however, have been black at the time of burial, is still found clinging to one of the skulls; while the shrivelled flesh and skin, as hard as stone, remains upon some of the lower limbs.

Another village in this cañon, of equal extent and similarly situated, though in a more advanced stage of ruin, was visited and some exceedingly interesting discoveries were made. Among the débris of the fallen building sandals, finely woven, but resembling nothing with which the present occupants of this territory are familiar, were found; as also were portions of matting and of garments made from the fibre of the yucca. Evidences of the great antiquity of some of these ruins are mixed with those of later occupancy in a manner most confusing to the archæologist. The Indian guide, George, in reply to an inquiry upon the subject, said that the Navajo tradition went back twelve times the length of the life of their oldest chief, now eighty years of age, and that the ruins existed unoccupied then. This carries one back about a thousand years; but the evidence is hardly valuable.

The party travelled fifteen miles in the Cañon del Muerte and discovered seventeen cliff-villages or clusters of dwellings, some of which it seemed impossible for people to have reached without wings. One curious, snug little village of a dozen or twenty habitations occupies a place which must have been cut into the cliff by the spray from an ancient torrent which came down from above. The track of the stream is unmistakable in the solid rocky crust above. It must have done its work of excavation and dried up long before the advent of the cave-dwellers; for one would as soon think of building under the overhanging cliffs of Niagara as of building there when the waters were coming down. The place is now several hundred feet above the stream which runs through the cañon. The number of ruined villages visited by this party was forty-six, some of which, however, had been visited by the same explorers before.— *New York Tribune.*

THE ILLUSTRATIONS.

THE YOUNG MEN'S CHRISTIAN ASSOCIATION BUILDING, PITTSBURGH, PA. MR. JAMES T. STEEN, ARCHITECT, PITTSBURGH, PA.

The street fronts of this building, which is about to be built, are to be of Bay of Fundy brownstone, red terra-cotta and Philadelphia brick, laid in red mortar.

HOUSE NEAR THE BRANDYWINE RIVER, DEL. MR. T. P. CHANDLER, JR., ARCHITECT, PHILADELPHIA, PA.

HOUSE OF E. J. SCHWARTZ, ESQ., PITTSBURGH, PA. MESSRS. STILLBURG & STAUB, ARCHITECTS, PITTSBURGH, PA.

BRIC-A-BRAC MANTEL FOR MR. CAMPBELL, IRONTON, O. MR. E. G. W. DIETRICH, ARCHITECT, PITTSBURGH, PA.

"Placarding" Infectious Diseases. — In discussing the "radical health ordinance" passed by the city authorities of Paterson, New Jersey, *The Medical Record* says with reference to placarding a house in which there is a contagious disease: "This plan of home advertisement of contagious disease has been tried in Chicago, if we remember correctly. It there failed because the people did not like it, and there were constant evasions of the law." The editor has evidently been misinformed. The placing of warning cards on all the houses infected with scarlet-fever was commenced in this city in 1877, with considerable opposition from householders and others who attempted to create a public sentiment opposed to the execution of the law. The State Board of Health, with all the prominent medical gentlemen of the city, sustained the Commissioner of Health in placing the cards, and all opposition has disappeared. A very mild form of scarlet-fever is now prevalent in the city. More than six hundred cards are in place on the outer doors of city domiciles, and the public has become so thoroughly convinced of the propriety of the warning card that citizens make haste to report to the Health Department all cases coming to their knowledge, and which have not been previously reported through the failure of the family to employ a physician. Only small-pox and scarlet-fever are placarded in this city. — *The Sanitary News.*

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Building for the Young Men's Christian Associat

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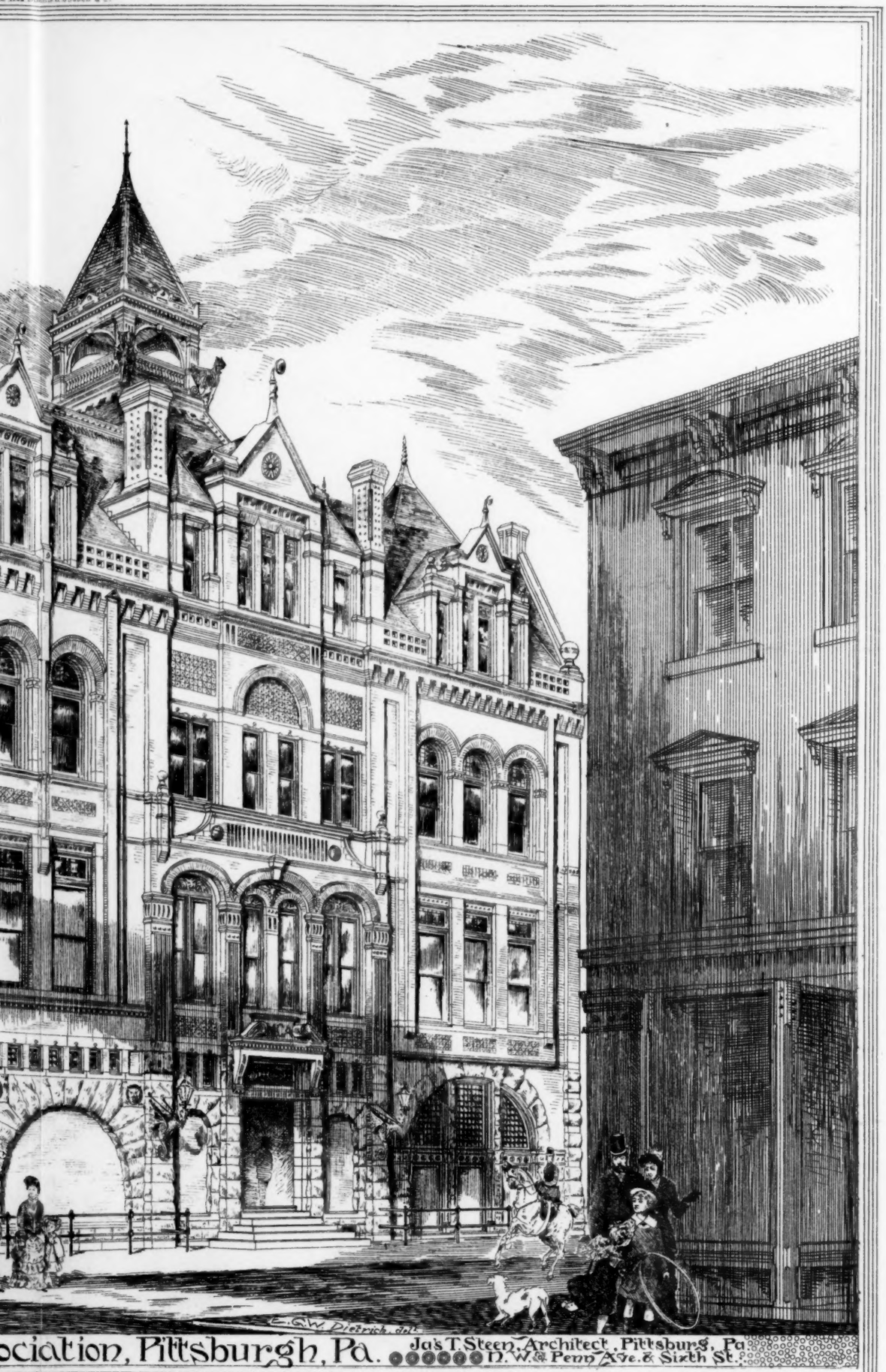

ociation, Pittsburgh, Pa. Ja's T. Steen, Architect, Pittsburg, Pa. N.W. Cor. Penn Ave. & Sixth St.

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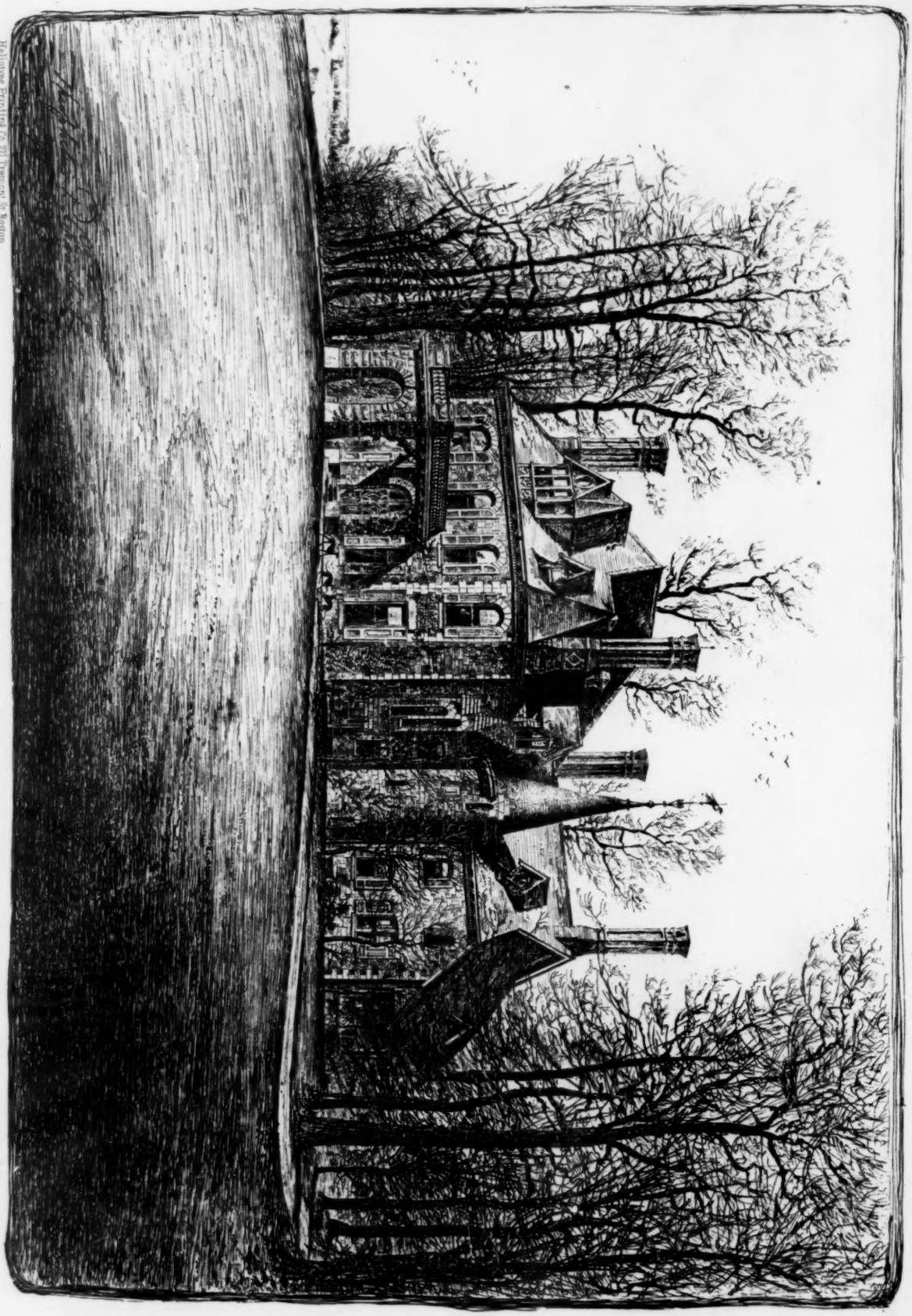

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HOUSE NEAR THE BRANDYWINE RIVER, DELAWARE.

Thomas P. Chandler, Jr. Architect, 265 Walnut Str. Philadelphia.

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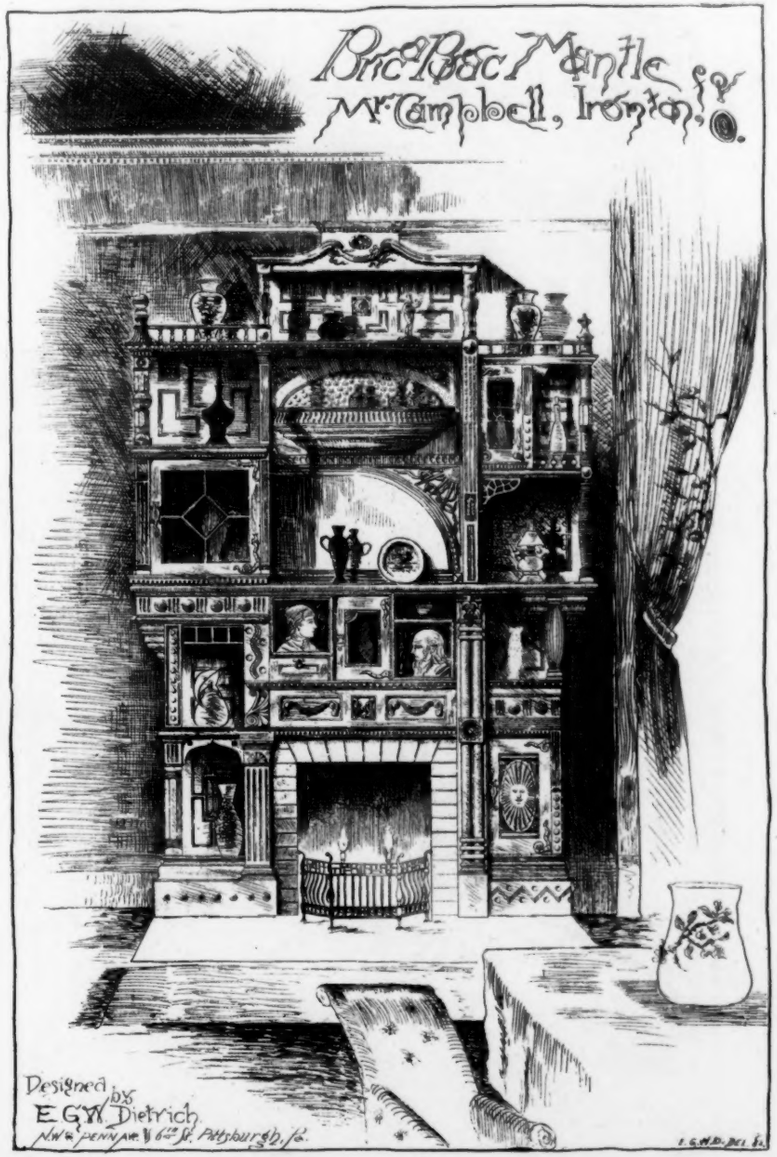
Residence for E. J. Schwartz Esq.

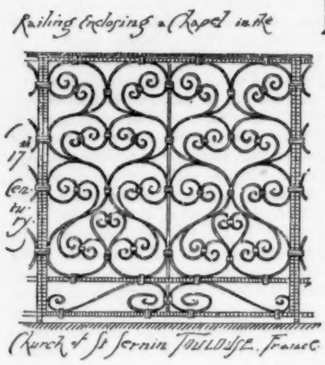
Stillburg & Staub, Architects ~ Pittsburgh, Pa.

Brick Rock Mantle for Mr. Campbell, Ironton, O.



Designed by E. G. W. Dietrich, N.W. Penn Ave. & 6th St. Pittsburgh, Pa.

DAMP WALLS.[1]



IN a recent issue of the *Badische Gewerbe-Zeitung* appears an article on this subject, the importance of which induces us to reproduce it in our columns, with such additions and remarks as seem to us desirable. The writer, Professor Meidinger, observes that, if in an old house wall-paper turns mouldy and peels off, the cause is dampness in the walls. The walls of an old house may turn damp from various causes: —

1. The rain sickers through a defective roof into the wall, or it penetrates a badly-pointed wall.

2. In the cold season vapor produced from special causes is deposited on cold walls.

3. The wall contains aphronitre (nitrate of lime. Chloride of calcium, which occurs less frequently, displays the same behavior; quarry-stones which remain wet contain probably one of these salts). The wetting of walls in consequence of the presence of hygroscopic salts is caused only rarely by the formation of saltpetre; most frequently sulphates of sodium, and especially of magnesia, show themselves, which are contained either in the mortar or in the bricks. Mortar of dolomitic limestone, which has been burned with fuel containing sulphur, especially has caused very frequently the formation of wet places. Even the presence of sulphuric acid in a damp atmosphere, in districts where much coal is consumed, has given rise to the formation of sulphate of magnesia in quarry-stones, and consequent damp walls, as was proved some time ago in London on façades of limestone containing magnesia (Portland stone).

4. The underground water reaches so high that it rises in the wall of the basement.

5. The house is built on a slope, so that the rain-water running down enters the wall of the basement.

First. The cause of the dampness named first may be removed by repairing the roof, or by repointing the wall. A coating with oil-paint of the outer face of the wall may also be recommended in certain cases. If the outer walls consist of timber and bricks, which cannot be joined closely, the method adopted, especially in mountainous districts, is very serviceable; that is to say, of covering-in the walls of the weather-side with boards or shingles, and for greater durability painting the latter in oil. On the Lower Rhine, slate, as used for roofs, is also employed. A cover with metallic slates is likewise to be recommended, and quite recently pressed plates have been used which have the character of shingles. All perfectly water-tight coatings and coverings on vertical surfaces of course keep off driving rains, and prevent the accumulation of dust and the growth of moss and lichen; but they form, at the same time, an impermeable layer, arresting ventilation through the walls, on which account they may prove injurious to health, under certain conditions, in over-crowded houses not provided with artificial ventilation. The duration of such coatings and coverings likewise is not very great, for oil-varnish becomes gradually humid, likely to form emulsions with water, and, when in that state, persistently retains damp, which penetrates also into the interior of the wall. It is evident that walls already damp cannot be dried by such means: that, on the contrary, their drying is prevented. On the other hand, the shingle walls in use in Switzerland, or the protective walls of Solingen plates employed in the country along the Weser, and the plates used on the Rauhe Alb in Würtemberg, besides the slate coverings, are quite to the purpose.

Second. The precipitation of damp and water on cold walls is observed principally in kitchens and in large rooms filled on occasions by large assemblages. In the former case the deposition of damp arises from the steam generated in cooking; in the latter it is caused by the breath of the people collected together. If the walls are painted with oil-color, drops of water are formed which collect on the walls, and in some cases even wet the floor. If the walls are coated with size-color, the water penetrates and makes them darker; as soon as the generation of steam is arrested for a time, they become perfectly dry again. If the walls are papered, the paper-hangings become wet and dark, to dry, however, again very soon and completely. The paper does not turn mouldy, but the paste will probably be destroyed in course of time, and the paper itself discolored. Under such conditions, the outer walls are chiefly exposed to the precipitation of water, especially if they are built of quarry-stones which are good conductors of heat. Brick walls are less exposed to such a deposition, and walls of tufa and wood not at all. If it is intended to protect an outer wall exposed to such precipitations, the simplest way is to board it. The boards of a thickness of 0.4 inches, are nailed to flat beading $\frac{3}{4}$ inch to 1.1 inch thick, and secured with hold-fasts to the wall, the intervening space being filled with straw. Thus a very bad conductor of heat is placed nearest the wall, upon which water will not be deposited. The warming of the room is also greatly facilitated by this means; for this reason, such a covering may be recommended in many cases, but especially for north or east walls, and more particularly for bedrooms. The boards are either covered with shirting, upon which the paper may be hung, or they are nailed with reeds (much used in place of laths in Germany) and plastered with gypsum, after which the wall may be treated in any manner desired. The cost of such a boarding is in Germany about 1*s.* per square yard, the shirting 7*d.*, the reed and gypsum coating 1*s.* 6*d.*

Third. Aphronitre is most frequently the cause of permanently wet walls, or such as become always wet in damp weather. It is observed principally in the lower stories. Its origin is due to organic substances containing nitrogen, especially exhalations of men and animals, which lodge in the walls and form nitric acid during their decomposition; the latter, in combining with lime, forms nitrate of lime. Its appearance is therefore most frequently met with in water-closets, in stables, and in the country very often on walls near accumulations of liquid manure. Nitrate of lime is a soluble salt (it is hygroscopic; that is, it absorbs water from the atmosphere, more or less according to the humidity of the air). In dry weather part of the water absorbed during damp weather passes back into the atmosphere. If a wall contains little saltpetre, it becomes light in color and dries in dry weather; during damp weather, on the contrary, it turns dark and wet. Should the wall contain much saltpetre, the wall is permanently wet, as in stables. Paper-hangings on a wall containing saltpetre appear dark during damp weather, and may easily be pulled off. The paste, kept damp for some time, gradually decomposes, and thus loses its adhesive property, the paper hangs loosely even in dry weather, and is held in place only at the permanently dry spots. The adhesive ingredients of colors are likewise destroyed, the colors fall off as dust, mould is formed and the whole appearance is totally deteriorated. The aphronitre possesses the property of spreading to a certain distance from the spot where it originates over the porous wall, through stone and mortar. It thus penetrates the whole thickness of the wall, and arrives, although generally found only on one side, at the other surface of the wall. Quite apart from its ugly appearance, a damp wall possesses other disagreeable properties. The adhesive ingredients of paper and color develop an unpleasant odor during their decomposition; the same is observed in mouldy paper-hangings, and in the timber in contact with damp walls. Effects injurious to health have consequently been often attributed to damp walls, although it would be difficult to prove such an assertion. Various means have been proposed for preventing damp in walls from aphronitre, or at least obviating the disagreeable consequences attendant upon its formation. We select some of the principal means suggested.

(*a.*) The evil cannot be remedied by simply removing the mortar coating, as far as it shows damp, even between the stones, and subsequent fresh plastering. After the mortar has become thoroughly hardened and dry, the wet places appear again after a little time during damp weather, although not quite as large as before. The saltpetre still in and between the stones gradually penetrates part of the new plaster, until it shows itself on the outside. There is no doubt that, even after removing this second plastering and putting on a third, the latter would show wet places, although of smaller dimensions. It might be possible to gradually extract the whole saltpetre from the wall, just as it is possible to remove oil spots from wood by repeated applications of wet pipe-clay. This method of drying a damp wall — although it would effect a radical cure, as long as no fresh formation of saltpetre takes place, and although it would be most advisable from a sanitary point of view — will not find much favor, on account of its inconvenience, tediousness, and expense. In the rare cases where actual formation of saltpetre is the cause of the dampness in walls, in stables, and closets, a coating of dolomite cement, to which some phosphate of magnesia has been added, has proved a very efficient means for preventing the further formation of saltpetre. As the formation of ammonia always precedes that of nitric acid, the ammonia combines rapidly with the magnesia contained in the mortar to form an insoluble phosphate of ammonia-magnesia, and the carbonic acid of the decomposing urine contained in the ammonia unites with the lime to form carbonate of lime. As it is, the not inconsiderable quantity of phosphoric acid contained in urine by itself causes the formation of the insoluble magnesia combination.

(*b.*) It is stated by practical builders that half-cement mortar, that is, ordinary lime-mortar mixed with the same quantity of Portland cement, is the best means for drying the walls of water-closets; no penetration of damp has been observed several years after the new coating has been applied. In Germany, instead of the ordinary Portland cement, Erdmenger's Portland cement of dolomite is considered the most suitable for the purpose.

(*c.*) For some time past it has been tried to prevent the penetration of the saltpetre still remaining in the stones into the fresh plaster by coating the stones and the joints between them with an isolating layer impenetrable by water. Asphalte, either by itself or mixed with linseed oil, has been used; pitch, common resin, and tar have likewise been recommended, the latter, however, less often, on account of its liquid state and its powerful smell. The mass must be melted and applied hot with a brush. It is imperative that the surface of the stones be completely covered, and the joints between

[1] From the *Builder*.

them perfectly closed up; the saltpetre will percolate through the smallest crack, and thus produce wet places on the wall. Before applying the isolating layer, the room must be artificially and very highly heated for several days, to make sure that the exposed stones and joints have been perfectly dried. The asphalte or its mixture with linseed oil must penetrate to a certain extent into the stones to insure a perfect adhesion; this is not possible if the stones are damp. Small places may also be warmed and dried by holding a charcoal pan close to them. Timber which may be in the damp wall must be treated in the same way; in this case it would be advisable to remove the stone-work round the piece of timber as far as it shows damp, to dry the latter well, and then coat it on all sides with asphalte. Upon this isolating layer, which should be from 0.2 inches to 0.4 inches thick without interruption, after hardening, ordinary plaster or gypsum is applied. In carrying out the above, the plaster should be removed, not simply where wet places show themselves, but from 1 foot to 2 feet round them, the isolating mass being applied to the same extent, so as to prevent the saltpetre from penetrating sideways and causing damp spots round the edge of the new plaster. It is not to be expected that the latter should combine closely with the isolating mass; it receives its support sideways from the old plaster still sound. This would be no objection where only small patches of plaster had to be renewed; but large wall-spaces would sound hollow, and probably might become detached unless a close junction of the plaster with the stones were effected by driving in here and there hold-fasts coated with asphalte, before the plaster is put on. A putty of asphalte and mastic, also, was successfully employed at the Allgemeine Hospital of Vienna.

(*d.*) A few years ago tin-foil was recommended as an isolating material. It was put on the wall with paste, after every vestige of the old paper had been removed, the fresh wall-paper being then put on the tin-foil. Although the latter is very cheap (the cost of pure tin-foil in Germany is only 3*s.* 7*d.* per kilogramme, or 1*s.* 9*d.* per lb., with which quantity a space of about 12 square yards may be covered), and the process is very simple, it was soon found that it cannot be put on a damp wall, on account of the paste decomposing. It was next tried to secure the tin-foil with tacks, but the latter soon began to rust; tin tacks might perhaps be more suitable. No case has been recorded in which tin-foil has been pasted upon a wall previously well dried either by natural means or artificial heat. If the wet places are not too large, it might be advisable to paste the tin-foil first on the paper, and, after drying, to put the paper on the wall, care being taken to use paste only for the part of the paper free from tin-foil. The paper would thus lie hollow against the wet place on the wall, where the tin-foil acts as a protector against damp. Lead-foil, in place of tin-foil, is not to be recommended, as lead is attacked by damp saltpetre.

(*e.*) Asphalte paper has sometimes been nailed on damp walls; but in such cases a covering of shirting is necessary for receiving the wall-paper. The cost in Germany is about 10*d.* per square yard. The protection, however, is not permanent, for the asphalte paper lasts only a few years.

(*f.*) There is no record as to the effect of painting damp walls, but it is well known that such a coating after some time blisters and finally peels off. It would be worth while to examine more closely into the question whether this always takes place or only under certain conditions. It is thought that several coatings of paint put on a wall well dried by artificial means would penetrate the same, and unite so closely with the plaster as to prevent a peeling-off taking place. Three coats of paint would in this case cost about 9*d.* per square yard. The paper would have to be put on before the last coat of paint is thoroughly dry, as otherwise the paper would not stick.

(*g.*) If wet places in walls assume large dimensions, it is recommended to face the wall with a brick (or tufa stone) wall or boards. The first is expensive and takes up room; joints with the old wall must be made with asphalted bricks to prevent a transmission of saltpetre. The second remedy is that to be adopted in most cases. The process is similar to that applied in boarding walls outside; filling in with straw, however, is omitted. For greater protection, the boards, as well as the beading fastened against the wall are coated with silicate paint. Such a coating on both sides of the boards costs about 2½*d.* a square yard. The whole expense for fixing such a boarding, including the covering with shirting, but excluding the wall-paper, is at most 2*s.* per square yard. It appears unnecessary to the author to provide for ventilation between the boarding and the wall by leaving openings at top and bottom, as it is not intended to dry the wall. A consequence of induced ventilation would be simply to cause the covered wall to absorb more or less moisture according to the state of the atmosphere, just as if the boarding had not been put, while with sluggish circulation the wall gets damp and dries more slowly, it being impossible to cut off the access of air entirely. By others, the necessity of thorough ventilation between wall and boarding is insisted on, it being pointed out that rapid circulation must tend to decrease dampness and at the same time prevent the otherwise inevitable formation of mould or fungus in the boards.

(*h.*) Quite recently, wood-hangings have been introduced in Germany, serving as isolating layer between ordinary wall-paper and damp walls. These hangings are made in the form of webs or wicker-work of strips of wood or shavings of North Swedish or Finnish pine, 0.04 inches thick, and 1.17 inches to 1.56 inches wide, which are said to resist the effects of damp for a number of years. They are manufactured in lengths of 22 to 33 yards, of a width of 2 feet six inches to 5 feet, and sold it at 1*s.* 4*d.* per square yard. The wood-hangings are fastened to the wall with galvanized nails, the nail-heads being covered with pieces of shavings slipped in, at a cost of about 6*d.* per square yard. A covering of shirting is also in this case applied before putting on the wall-paper. This wicker-work may be directly used for panelling; the panels are produced by beading, and by leaving the whole in that state, or applying coatings of varnish, or painting the several stripes with various oil-colors. Patterns may in this manner be made at a cost of 6*d.* per square yard; one coating of varnish at 2½*d.*; of oil-paint, at 6*d.* to 1*s.*

Fourth. When underground water is the cause of dampness in walls, aphronitre, as a rule, always co-operates. Water alone does not rise so high, as we know from the behavior of cellars, the sole of which very often is only just above the level of underground water, and the walls of which are nevertheless quite dry. The same means of prevention as above mentioned may be employed; they are, however, only palliatives which do not dry a damp wall. A radical cure may be effected only either by a perfect isolation of the wall from the source of the damp, which may be done in existing walls by draining at intervals, and isolating from the ground below by the insertion of sheets of asphalte felt, — or by completely eradicating the damp from the wall. This may be done by stamping-in between the damp wall, which must be previously stripped of its plaster, and a provisional planking, a layer about two inches in thickness, of fresh quick-lime powder. For outside walls the planking may be dispensed with; all that need be done is to dig a trench along the foundation, and fill it with lime. The damp may also be got rid of by heating the rooms with coal-baskets, and by drawing the heated air from the interior by means of a suction-pump connected with a box provided with india-rubber packing, which is pressed against the other side of the wall.

Fifth. When a building is erected on a slope, and the higher wall becomes saturated with percolating rain-water, a cure can only be effected by cutting a deep trench, and thus draining off the water. If substances containing nitrogen and conducing to the formation of saltpetre have been introduced into the wall through rain, the latter will continue to be damp, and the only palliatives against their injurious effects on the inside faces of walls are those already pointed out.

Since the above was written, the *Badische Gewerbe-Zeitung* has published a few additional remarks by Dr. Meidinger. It is stated that in several cases of dampness in walls a coating of oil-paint, upon which subsequently tin-foil has been pasted, has been found efficient. The two substances combine very closely, and permit of the hanging of paper afterwards. The paint must, however, be put on only in dry weather, or after artificial drying of the wall, and the wet places have entirely disappeared. With regard to boarding of damp walls, it is added that it should not be neglected to asphalte the beading to which the boards are nailed, to protect them against the absorption of water and consequent destruction. Moreover, the boards must not be too far away from the wall, on account of mice. The introduction of air-holes is also to be recommended, experience having shown that in their absence the wood becomes fusty. It has already been pointed out that it is advisable to coat the boards with silicate paint, to prevent rotting. This little extra expense should not be spared, for it is by no means yet proved whether air-holes alone will preserve the boarding; moreover, the introduction of openings for ventilation may be inconvenient. In any case, the naked boards must not touch the wet wall, as otherwise saltpetre would enter them and make them damp also. It would, perhaps, be advisable to remove the plaster wherever damp shows itself, before nailing down the boards. The wall would then absorb less moisture from the air, and would lose it quickly again in dry weather; under these conditions, the space between boards and walls would contain damp air for a shorter time, the presence of which is injurious in any case.

Finally, with respect to the introduction of an isolating layer between stones and mortar, we learn from a prospectus lately issued that a special putty, called Weissang joining-putty, has been introduced in Germany, which appears to answer the purpose well. The mass, of the nature of asphalte, but without smell, is boiled with an equal weight of linseed oil, and put on as hot as possible. It is stated that about 2 lbs. of the mixture cover 1 square yard of wall-space. The mass is sold retail in Germany at 1.80 mark per kilogramme (11*d.* per lb). As the price of linseed oil there is about 6*d.* per lb., to coat 1 square yard would cost 1*s.* 5*d.* The mixture is applied in a peculiar manner. The wall is stripped of its plaster, the joints being picked out deeply. The latter are then freshly set with mortar. After drying, the hot mixture is put on, and the wall at once thinly rough-plastered. When the latter has dried, plastering is proceeded with as usual. Under these conditions, a close connection of the plaster with the isolating mass is effected. The latter is recommended also for the protection of gable walls on the weather-side against the penetration of damp; as a substitute for reeds (laths) in plastering on wood; for painting timbers and iron-work in new buildings; for preventing the growth of fungus on wainscoting and other wooden linings; finally, for coating hoardings, garden-rails, barriers, posts, tree and vine stakes.

MONTHLY CHRONICLE.

DECEMBER 31. Death of Léon Gambetta at Ville d' Avray, France.

January 1. Burning of the gallery of paintings belonging to Miss S. Gibbons, 1160 Broadway, New York.

January 3. Burning of the Naumkeag House, Peabody, Mass. The inmates barely escape with their lives.

Serious floods in Germany, causing incalculable damage.

Serious rents discovered in the central tower of Peterborough Cathedral requiring the immediate demolition of the affected parts.

January 4. Burning of St. Mary's Episcopal School for Young Ladies, Knoxville, Ill. Only one of the one hundred pupils hurt.

January 6. Earthquake in northern Ohio.

January 10. Burning of the Newhall House, Milwaukee, Wis. Seventy-four lives lost. Many injured.

January 11. Earthquake shocks felt in Tennessee and Indiana.

January 12. Death of Clark Mills, sculptor, at Washington, D. C.

January 13. Car-shed at Allentown, Pa., crushed by snow. Loss, $12,000.

January 14. Burning of the Russell House and other buildings, Milwaukee, Wis. Loss, $100,000.

Burning of the Circus at Berdichev in Russian Poland. Two hundred and sixty-eight persons burned.

Burning of the Planters' Hotel, St. Louis, Mo. Four lives lost. Loss, $30,000.

January 15. The Seneca Hotel at Baldwinsville, N. Y., is destroyed by fire. Five persons injured.

January 16. Kherson, a fortified town of South Russia, nearly destroyed by fire.

Twenty-two earthquake shocks felt at Murcia, Spain. Several buildings destroyed.

Burning of Tweddle Hall, Albany, N. Y. Loss, $250,000.

Earthquake shock throws down two houses at Carlsbad, Austria.

Eleven earthquake shocks felt at Archena, Spain.

January 18. Fall of two houses on East Cambria Street, Philadelphia, during repairs. No one hurt.

Explosion of a calcium-light reservoir at the Grand Opera-House, Milwaukee, Wis. Two persons hurt.

January 19. Burning of the Quincy House, Quincy, Ill., the largest hotel in the city. One person injured. Loss, $30,000.

Gunpowder factory at Muiden, a fortified town of Holland, explodes and nearly destroys the town. More than forty persons killed.

January 20. Explosion of the largest gasometer in Glasgow, Scotland. Eight persons injured. Loss, $50,000.

January 21. Explosion of a Giant Powder factory at Berkeley, Cal. Twenty-three men killed. Thirteen wounded.

The town of Susanville, Cal., destroyed by fire.

January 23. Death of Gustave Doré at Paris.

January 24. A portion of Ward 2, Wilkes-Barre, Pa., sinks five to ten feet because of the caving of mines beneath the city, causing much damage to buildings.

January 25. Opera-house at Defiance, O., burned. Loss, $45,000.

January 26. Partial burning of the Milwaukee College for young ladies, at night. The sixty pupils saved unhurt.

Gas explosion in a steam-heating pipe man-hole, New York. Four persons injured.

THE CALCULATION OF GIRDERS.

TOPEKA, KAN.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — The series of articles on "Girders," which have recently appeared in your journal, will undoubtedly be of great service to many draughtsmen and architects who are willing to spend the time and mental effort to become familiar with the processes there expounded. But it seems to me there are several errors in statement and conclusion, the correction of which would add materially to their value. The first matter to which I would draw your attention is that of the question of shear in a bent beam. The author says (No. 356, p. 193), "since the shearing-strain acts at right angles to the girder, *the additional area* required to safely resist it will vary directly as the shear itself." Why additional area? It seems to me that the section of a beam should be fixed by the bending moment, and that almost invariably (especially in the case of prismatic beams) this section will be more than ample to resist the shearing action of the load. After examining the authorities on the subject, I see no reason for changing my opinion. The author appears to think that the shearing stress in a bent beam goes directly to aid the stress from bending moment in rupturing the beam, and therefore that more material must be added; whereas it is commonly accepted as true that the shearing stress in a bent beam is distributed over the section of a beam, so that it is a maximum at the neutral surface and 0 at the extreme fibres; the distribution of stress from bending being, on the contrary, a maximum at the extreme fibres and 0 at the neutral plane. The foregoing is reason enough, it seems to me, for regarding the author's *general formula* for additional section as simply an approximate formula for the total section required, if it should be necessary to proportion a beam for shear alone. Prof. Rankine says (*Civil Engineering*, p. 267): "The smallest cross-section of a beam is generally fixed by reasons of convenience, independent of the shearing force to which it is exposed, and *is generally much greater* than is necessary in order to bear that force; but when it is practicable to adapt the least cross-section of the beam accurately to the shearing force, the preceding formulæ and table furnish the means of doing so by making $q_o = \frac{f'}{s}$; where f' is the modulus of rupture by shearing, and s a factor of safety. This equation gives for the least sectional area,

$$A = \frac{q_o A}{F} \cdot \frac{F}{q_o} = \frac{q_o A}{F} \cdot \frac{sF}{f'};$$"

in which formula $\frac{q_o A}{F}$ is a constant dependent upon the cross-section, and is given in the table previously referred to, for various forms of section;" that for a rectangle being $\frac{q_o A}{F} = \frac{3}{2}$, which would reduce the general formula above to $A = \frac{3sF}{2f'}$ for rectangular wooden beams, in which A = area of section, and F = total shearing force.

For a thorough exposition of this subject of shear, see Rankine, *Civil Engineering*, pp. 266–268, etc. Applying the above formula to *Example* 1 (p. 241) of Prof. Ricker's article we have, $A = \frac{3 \times 5 \times 4}{2 \times 1.24} = 24.2$ square inches as the total sectional area required, and as the beam is already 16″ x 18.75″, it would seem to be amply large.

Authorities are agreed that transverse shearing force has no material effect upon deflection, so that even if the Professor's theory were correct, he has already added 1.62 inches to the depth of the beam above that required for breaking load; also by adding this 1.01 inches to *depth* of girder, he has increased its capacity to resist deflection far beyond that necessary, as deflection varies as the cube of depth. This additional depth for shear might look necessary if the Professor's theory were true, in the case of a beam loaded at the centre; for here the shear would be the same from point of support to load, where it changes sign; but in the case of a beam loaded with a uniform load, or loads placed at various points, the shear would almost invariably be a maximum where the beam was subject to a bending strain of only a small proportion of the maximum moment; so that it is very difficult to see why a beam loaded as in *Example* 2, Case 2, should have any material added to resist shear, even when a beam with centre load requires it. The next matter which seems to me to be open to criticism is the statement in regard to the area of "inertia" figure (No. 359, p. 229), where the author says: "Draw a series of horizontal lines across the figure, at equal distances from the horizontal previously drawn through intersection of the tangents, and from each other. Measure the length of that portion of each line included between the equilibrium curve and its tangents. Take the sum of half the upper and lower ordinates and the entire intermediate ones; multiply this sum by the vertical distance between two adjacent ordinates. This product will be the required area, though slightly in excess because practically substituting a polygon with short sides for the equilibrium curve. It differs very little from the true area, which it approximates the more closely, the closer the horizontals are drawn to each other." Now I think it will appear, from what follows, that this statement is only true when the distances from horizontal through centre of gravity to horizontals through tangent points are commensurate, and the divisions are a common divisor of these distances, and then only by making this statement so *very general* that the upper and lower ordinates are taken to be 0; a circumstance that would be hardly noticed by the draughtsmen using this method. The correct formula for the area of figure *n. h. m.* (see Fig. I.) in which *S Y* and *S R* are commensurate, and in which the end figures, *n a b* and *m i k*, are taken as triangles, and the remaining divisions as trapezoids, is $A = x\left(\frac{ab+ik}{2} + \frac{ab+cd}{2} + \frac{cd+ef}{2} + \frac{ef+gh}{2} + \frac{gh+ik}{2}\right)$ which reduces to $A = x\,(ab + cd + ef + gh + ik)$, or x(the common distance) into the sum of the ordinates. Now, considering the extreme ordinates 0, the Professor's statement would be equivalent to this. Again, taking *any* small distance, x, and spacing it off above and below the horizontal line through centre of gravity, there will be a triangle formed at each end of inertia figure, whose perpendicular, let fall from the tangent point on its base, the last ordinate produced, will be always less than the constant space, x. But by following the rule in its only correct interpretation, and considering the end ordinates 0, this perpendicular would be made equal to x for both end triangles, and we would therefore obtain an area in excess over and above that obtained by considering the equilibrium curve to be made up of straight lines between ordinates. The statement made in the text is correct for a figure of this form, as will be readily seen by making a summation of the small areas, assuming them to be trapezoids, and should only be used for these inertia figures when the distances above and below the horizontal are divisible by the constant distance x, and then only by considering the extreme ordinates to be 0. The above may account for the fact that the area of inertia figure in Figure 66, p. 229, is stated in the text to be 14.41, is written on the figure 14.49, and that a literal application of the rule would make it 14.50 as nearly as can be determined from the minute and obscure figures. I think the following will give a close approximation to the true area, and in fact would give the exact area if the equilibrium curve were composed of straight lines between the extremities of ordinates: Divide the distance between horizontal through centre of gravity and horizontal through upper tangent point into any number of equal spaces, as small as practicable; divide the distance between centre-of-gravity horizontal and horizontal through lower tangent into any number of

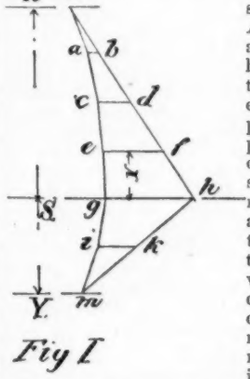


Fig I

equal spaces (not necessarily the same as those above the centre-of-gravity horizontal); draw horizontal lines through the points-of-division above and below. Measure the lengths of all the ordinates between tangent and equilibrium curve; then if the perpendicular distance between the ordinates above the line is x, and that below the line is y, the area of the inertia figure will equal x into (the sum of all the ordinates above the axis and one-half the ordinate measured on axis) plus y into (the sum of all the ordinates below axis plus one-half the ordinate measured on axis).

Perhaps a reference to a figure and algebraic expression will avoid ambiguity. See Figure II.

$$\text{Area } e\,f\,m = y\left(\frac{ef+gh}{2} + \frac{gh+ik}{2} + \frac{ik}{2}\right)$$

$$= y\left(\frac{ef}{2} + gh + ik\right)$$

$$\text{Area } e\,f\,n = \times\left(\frac{ef}{2} + cd + ab\right)$$

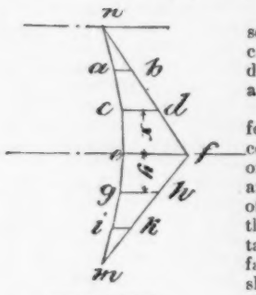


Fig II

Of course it will not be necessary to scale the differences x and y, as they can be obtained by dividing the known distances from axis to extreme fibre by any desired number.

On page 203 of number 357 the Professor says, in reference to a girder composed of several timbers laid one on the other. "If the timbers are not fastened together, the strength of such a girder will be little more than the sum of the strengths of the timbers taken separately, ... but if firmly fastened together so as to prevent all slipping, the girder would act as a single beam of equal depth. . . . Letting n = number of timbers of which the girder is composed, the girder would then be very nearly n times as strong as if the timbers were merely laid on each other and not fastened." And again, speaking of girders such as that represented in Figure 44: "A key at each end will usually be sufficient, since no slipping can occur if the ends are fixed." Now, by reference to *Example* 7, page 242, number 360, it will be seen that two timbers bolted and keyed together as above described are treated as if they were separate, and the sum of bending moments that each would bear separately is taken as the amount that the compound girder would bear. The *exact* strength of no girder can be calculated, but it would seem as if a sufficiently exact approximation of the strength of this girder could be obtained by either the graphical method or by direct calculation; for considering that the centre of gravity of the girder, as a whole, can be readily found, the moments of inertia of the beams, separately, can be easily calculated, and then the moment of inertia of the whole figure, obtained by adding in each case, the area of section of beam into the square of the distance between axes.

Proper allowance should be made for bolting, keying and gaining in joists, but the latter is the only weakening that needs much consideration; the bolts and keys can be placed where the strain from bending is not a maximum. It seems to me if the joists were properly bridged there would be little need of gaining them in. At any rate the moment of inertia could be taken at the weakest point where one of the joists is gained into girder. It really seems like a great waste of material to make the calculation as in the example, especially when we consider that the deflection varies as the cube of the depth, and that this girder is calculated with reference to the deflection. It is to be hoped that the articles will be completed by some discussion of many matters which come up in designing girders, such as: the stiffness of vertical web to resist buckling from shear; the methods of making joints in riveted girders; the proper spacing of rivets or other fastenings at the joints, and between the web, and flanges, etc. If these matters are left untouched they will arise to plague any draughtsman who attempts to design a built girder. Hoping that the above will be of some service in arriving at a proper understanding of the subject, and that I have not trespassed too much on your valuable time, I remain, Respectfully,

J. W. P.

THE $3,000-HOUSE COMPETITION.

Milwaukee, Wis., January 30, 1883.

To the Editors of the American Architect: —

Gentlemen, — The *Architect* of the 27th is just at hand, and "*Try*" feels very much gratified to think that his rendering of the problem meets with sufficient approval to warrant its publication.

He notices in the estimate that under the head of Second Story, last line but one, "Floors all in matched fencing" has an interrogation mark after it. It probably occurred to "*Try*" at this point that it might be thought that he had omitted the item of flooring which is all included in second item under carpenter-work. It would have been better if the remark had been made in some other place.

Also in specification under "Carpenter," "Lining-Boards" should read "planed and matched fencing" instead of "furring," as printer has it.

It is customary here in this section to use second-quality pine, matched and planed one side, for lining-boards and floors in good work, and it goes under the name of matched fencing.

Perhaps "*Try*" may be admitted an additional word; he notices that he has said nothing about builders' profit. The estimates are on a basis of ten per cent margin.

Press of office duties had made him somewhat short of time, and the final writing and summing up were done on the last day which would enable them to reach Boston in time. The Newhall-House fire came on the same day, and with its attendant loss of life "*Try's*" mind may not have been quite as steady as he generally means to carry it. At all events he sees some things in both specifications and estimates that another writing would put somewhat differently.

He is very confident from experience that he can build the house here for the money. Yours very truly, "*Try.*"

THE SAN FRANCISCO VETERANS' HOME COMPETITION.

San Francisco, Cal., January 23, 1883.

To the Editors of the American Architect: —

Dear Sirs, — Business is rather quiet at present but prospects good for coming year. Labor and materials same as last quoted. It may be of interest to you to know of the last fiasco here in regard to competitions, viz: — The Veterans' Home, to be built by popular subscription. To begin with, when the project was first brought forward an offer was made to members of the organization to furnish plans and specifications as a donation, and several months after, when asked in reference to the matter, the offer was agreed to. Then came a squabble in the management, and advertisements calling for a competition; which, of course, gave the architect first-mentioned an honorable chance to withdraw his offer. The amount tendered as a premium was ridiculously small, and only three architects put in plans. Messrs. Kirby & Son estimated cost $12,000; Messrs. Newsom (who style themselves *East-Lake* architects), $10,000; and Messrs. McDougall & Son, $17,000. The advertisements called for buildings not to exceed $10,000. Hence Messrs. Newsom, who offered bonds to complete the buildings for the sum named, were really entitled to the premium; and next in order the Messrs. Kirby. But after allowing Mr. McDougall to take his plans, and make alterations and re-submit them, the decision was in favor of Messrs. McDougall & Son.

The coolest thing throughout has been the way the money has dwindled down from some thirty odd, to seventeen thousand dollars now remaining in the fund, and the confident way in which the managers say if the buildings cost more than $17,000 the public will contribute more to the fund. Messrs. Newsom have charged unfair dealing, and righteous indignation is the answer. But this is a fair sample of the result of offering to architects such *large* inducements.

S.

NOTES AND CLIPPINGS.

A Water-proofing Compound for Brickwork. — For water-proofing brick walls the following has been given. Dissolve soft paraffine wax in benzoline spirit in the proportion of about 1 part of the former to 4 or 5 parts of the latter by weight. Into a tin or metallic keg place 1 gallon of benzoline spirit, then mix 1½ pounds or 2 pounds wax, and when well hot pour into the spirit. Apply the solution to the walls whilst warm with a whitewash brush. To prevent the solution from chilling, it is best to place the tin in a pail of warm water, but on no account should the spirit be brought into the house, or near to a light, or a serious accident might occur.— *Van Nostrand's Engineering Magazine.*

A Monarch of the Forest. — H. Tabor & Sons, Manistee, Mich., write that they recently cut a pine tree, at their camp in Section 21, Township 25, Range 5, on the Big Manistee River, that was 164 feet long, 100 feet from the ground to the first limb, and as round as a dollar. Eight logs were cut from it that measured as follows:

LENGTH, FEET.	DIAMETER, INCHES.	SCALE, FEET
16	42	1,444
16	41	1,369
16	41	1,369
16	39	1,225
16	37	1,089
16	36	1,024
14	29	547
16	25	441
Total..126		8,508

It would seem that 8,508 feet is about enough for the logs of one tree to measure, even if none of them got away, but in this case the returns are imperfect, from the fact that the log, which would have made two more logs, was so badly broken as to render it of no value. Tabor & Sons are of the opinion that this is the largest tree ever cut on the river. — *Northwestern Lumberman.*

Hair *vs.* Wrought-Iron. — The *Mechanical Engineer* reports a curious effect produced on a wrought-iron forging by a human hair. The forging was in a cold press, that is a powerful press for finishing the forging after it is shaped. During this process it is put between two hardened steel dies and subjected to a pressure of 200 tons to the square inch. At one of these operations a hair taken from the head of a bystander was placed on the face of the forging and the full pressure applied. The result was that the hair was driven into the forging and imbedded in it. The hair itself was uninjured during the operation and was removed intact by Mr. Manning Merrill of Merrill Brothers, Williamsburg, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

WAREHOUSE. — Mr. Chas. L. Carson, architect, is preparing drawings for Mr. E. Bamburger, for a five-st'y and basement warehouse, to be built on Lombard St., for Mr. Howard. It is to be of brick, with stone and terra-cotta finish, 35′ x 170′, and to cost about $30,000.

BUILDING PERMITS. — Since our last report twenty permits have been granted, the more important of which are the following:

Lawrence Turnbull, 6 three-st'y brick buildings, n s Hoffman St., cor. of Chester St.

Jas. D. Hodges, 20 two-st'y brick buildings, w s Bruce Alley, between Saratoga and Mulberry Sts.

Otto Daker & Co., three-st'y brick warehouse, n w cor. Canton Ave. and Albemarle St.

Valentine Roberts, 2 two-st'y brick buildings, s s Chew St., e of Wolfe St.

Henry Waterman, 5 two-st'y brick buildings, e s Fremont St., s of Presstman St.

John H. Garrettson, 5 three-st'y brick buildings, n s Harlem Ave., between Arlington and Carrollton Aves.

Henry Westphal, 9 two-st'y brick buildings, s s Bloomsburg St., between Light and Byrd Sts.; and 11 two-st'y and basement brick buildings, n s Barney St., between Light and Byrd Sts.

John Schmidt, 5 two-st'y brick buildings, w s Vincent Alley, s of Thompson St.

S. O. McComas, 6 two-st'y brick buildings, s s Cole St., e of Gilmor St.

Louis Adler, five-st'y warehouse, 28′ x 77′, n s Lombard St., w of Front St.

Chas. Kerndl, three st'y brick building, with two-st'y dyeing-house in rear, w s Gay St., between Front and High Sts.

Boston.

BUILDING PERMITS. — *Wood. — D St., Nos.* 217-219, Ward 13, for Michael and Hugh H. Campbell, 2 three-st'y flat dwells., 20′ x 32′.

Florence St., near Ashland St., Ward 23, for Matthew Quigley, two-st'y pitch dwell., 23′ x 28′; ell, 14′ x 21′; Alexander Rogers, builder.

Cottage St., near Dudley St., Ward 20, for Emma Mills, two-st'y pitch dwell., 21′ x 30′; ell, 16′ x 22′; James C. Mills, builder.

Chelsea St., No. 333, Ward 1, for Alfred B. Wilton, one-st'y pitch mechanical, 21′ x 33′; Walter D. Johnson, builder.

Nonanatum St., near Oak Sq., Ward 25, for Patrick J. Curley, 2 two-st'y pitch dwells., 11′ 6″ and 17′ x 29′; Jas. Keefe, builder.

Newman St., No. 5, Ward 15, for Henry Grimes, two-st'y flat dwell. and store, 20′ x 36′; Henry Grimes, builder.

Washington St., near Neponset St., Ward 24, for Boston Gas-Light Co., storage, 20′ x 20′; Benj. Tarbox, builder.

Tremont St., near Whitney Court, Ward 22, for Bernard Krickser, three-st'y hip dwell., 15′ and 22′ x 49′ 6″; McDonald & Tobin, builders.

Brooklyn.

BUILDING PERMITS. — *Hart St.*, s s, 90′ e Sumner Ave., 3 two-st'y and basement frame dwells., tin roofs; cost, each, $3,000; owner, Thos. Moore, Sumner Ave., near Stockton St.; builder, J. Rueger.

Lewis Ave., w s, cor. Hart St., 3 two-st'y and basement frame dwells., tin roofs; cost, each, $3,000; owner, etc., same as last.

Sackett St., n s, e s cor. Gowanus Canal, one-st'y frame shed, slated roof; cost, $6,800; owner, the Municipal Gas Co., 342 Fulton St.; architect, J. F. Harrison; builder, R. Deeves.

Herkimer St., n s, 200′ w Hopkinson Ave., 6 two-st'y frame dwells., gravel roofs; cost, each, $1,600; owner, G. H. Bishop, New York City; architect, G. H. Chamberlain.

Suydam St., s s, 320′ e Broadway, two-st'y frame tenement, tin roof; cost, $3,500; owner and builder, John Zoellner, 100 Graham Ave.; architect, W. Clement.

Union Ave., Nos. 6 *and* 8, e s, 25′ n Broadway, 2 four-st'y brick buildings, tin roofs; cost, total, $10,000; owner and builder, Louis Bossert, 1830 Johnson Ave.; architect, T. Engelhardt.

Evergreen Ave., e s, about 15′ from Melrose Ave., toward Georgia Ave., three-st'y frame double tenement, tin roof; cost, $4,000; owner, J. Thieling, Evergreen Ave., near Georgia Ave.; architect, L. Scheiinger; builders, H. & D. Cook and J. Pohlman.

Bushwick Ave., e s, 25′ n Maujer St., three-st'y frame double tenement, tin roof; cost, $4,200; owner, Michl. Simon, 262 Devoe St.; architect, G. Hillenbrand; builder, D. Kreuder.

Bushwick Ave., n e cor. Maujer St., three-st'y frame store and double tenement, tin roof; cost, $5,000; owner and builder, Peter Kaiser, 210 Teneyck St.; architect, G. Hillenbrand.

Cincinnati.

RAILROAD SHED. — The I. C. St. L. & C. Railroad have lately contracted with Mr. M. Clements for an additional shed for the new depot they are building in this city, 86′ x 300′; cost, $20,000, to be built of iron, and to have Rendle's patent skylights.

BUILDING PERMITS. — C. R. Mabley & Co., four-st'y brick building, Fifth St., between Walnut and Vine Sts.; cost, $2,500.

Samuel Kuhn, 4 three-st'y brick dwelling-houses, Richmond St., between Cutter and Linn Sts.; cost, $20,00 ; Mr. Samuel Hannaford, architect.

Frank Byers, repair store front, Nos. 5, 7, 11 West Fifth St.; cost, $2,500.

C. Bassenhort, three-st'y brick dwell., Spring Grove Ave., near Liberty St.; cost, $5,000.

Lawrence Beck, three-st'y brick building, Elm St., near Green St.; cost, $4,500.

H. Quencel, two-st'y brick dwelling, Marshall Ave., near Moulton St.; cost, $2,500.

Louis Stix & Co., seven-st'y brick warehouse, Vine St., between Race and Elm Sts.; cost, $20,000.

Mrs. L. Rover, four-st'y stone front store, Elm St., near Fourteenth St.; cost, $5,000.

H. Weisgesher, three-st'y brick building, 91 York St.; cost, $4,000.

Ten permits for repairs; cost, $9,050.

Chicago.

APARTMENT-HOUSE. — Edbrooke & Burnham have prepared plans for an apartment-house for E. S. Heaton, to be built on Warren Ave., opposite Union Park. It is to be of pressed brick, stone finish, three stories, and to cost $12,000.

DWELLINGS. — L. A. Herrick is to build a three-st'y residence, pressed brick with stone finish, 30′ x 70′, Elizabethan style, at No. 2618 Prairie Ave., from plans by Edbrooke & Burnham; to cost $16,000.

The same architects have in hand designs for a two-st'y and cellar frame residence, 25′ x 50′, for G. F. Gossman, Hyde Park; to cost $5,000.

A house for Charles Nimrod is to be built on Belden Ave., by H. F. Starbuck, architect, at a cost of $7,000.

MORGUE. — The Commissioners of Health and of Public Works are arranging to build a new morgue.

STATION-HOUSES. — The lowest bidder for the erection of three police station-houses is Geo. C. Bodmer, as follows: East Chicago Ave. station, $1,382; West Chicago Ave. station, $1,260; North Ave. and Milwaukee Ave. station, $2,498; total, $5,140.

BUILDING PERMITS. — Chicago North Division Railway Co., three-st'y and basement brick office-building, 54′ x 125′, s e cor. Clark and Division Sts.; cost, $25,000.

W. & E. Batchelder, change factory into flats, 25′ x 65′, 363 East Division St.; cost, $2,000.

Chas. Mears, additional story, 50′ x 100′, 227 and 229 Michigan St.; cost, $2,000.

Schlitz Brewing Co., two-st'y brick offices and barn, 40′ x 90′, Ohio and Union Sts.; cost, $8,000.

J. F. Groh, one-st'y brick cottage, 20′ x 50′, 267 Rumsey St.; cost, $1,000.

New York.

STORE. — The store proposed to be built for Messrs. Park & Tilford, on Fifth Ave., between Fifty-ninth and Sixtieth Sts., it is now decided will be larger than at first intended, and will have a frontage of 50′ on Fifty-ninth St.; the frontage on Fifth Ave. will be the same, and will be iron on the first st'y, and above brick, brownstone and terra-cotta. The building will cover a plot of 11,250′, and the designs are being drawn by Messrs. D. & J. Jardine.

TENEMENT-HOUSES. — Seventeen double tenement-houses, brick and brownstone finish, 25′ x 60′ each, on Tenth Ave., Twentieth, and Twenty-first Sts.; Mr. Geo. H. Pelham, architect.

FACTORY. — A factory and stable are to be built at No. 262 West Forty-first St., for Mr. P. Maresi.

STABLE. — A large stable is to be built on the s e cor. of Fifty-first St. and Broadway, for Mr. Henry Quigley, from designs of Mr. Henry J. Dudley.

CHURCH. — For the Bethany Presbyterian Society a church of brick, terra-cotta and stone, in the Gothic style, to cost about $30,000, is to be built at Mott Haven, from designs of Mr. Jas. L. Farnsworth.

THEATRE. — Mr. Harry Miner is to build a new variety Theatre at the cor. of Christopher and Bedford Sts.

TENNIS-COURTS. — At No. 18 East One Hundred and Thirtieth Sts., for the Mount Morris Apartment-House Association, the building now standing is to be altered and additions made, to be utilized for bowling-alleys and tennis-courts; Mr. Wm. B. Tuthill is the architect.

BUILDING PERMITS. — *Ave. A*, s w cor. Ninetieth St., five-st'y brick school-house, tin roof; cost, $45,000; owners, Board of Managers of the St. Joseph Orphan Asylum, Joseph Helmprecht, President, 173 East Third St.; architect, A. H. Blankenstein; builder, not selected.

Twenty-first St., s s, 300′ w Tenth Ave., 2 four-st'y brick tenements, tin roofs; cost, each, $12,000; owner, Clinton Sutphen, 20 Nassau St.; architect, Geo. B. Pelham.

Second Ave., n w cor. Seventy-first St., five-st'y brick tenement and store, tin roof; cost, $17,000; owner, Mary M. Kircheis, 508 East Eighty-ninth St.; architect, W. Jose.

Second Ave., w s, 26′ n Seventy-first St., 3 five-st'y brick tenements and stores, tin roofs; cost, each, $11,000; owner and architect, same as last.

Ave. B, No. 258, five-st'y brick tenement and stores, tin roof; cost, $14,000; owner, Mrs. Matilde C. Jantzen, 301 Sixth St.; architect, John M. Forster.

Seventy-eighth St., n s, 275′ w First Ave., 4 four-st'y brick, brownstone front tenements, tin roofs; cost, each, $15,000; owner, Jacob L. Maschke, 192 Division St.,; architect, J. C. Burne.

Courtland Ave., w s, 50′ s One Hundred and Fifty-second St., three-st'y frame dwell., tin roof; cost, $2,500; owner, R. A. Sanginetti, 377 North Third Ave.; architects, Kerby & Archer.

South Fifth Ave., No. 61, five-st'y brick tenement, tin roof; cost, $18,000; owners, R. & A. Thomas, trusts, 3 Mercer St.; builders, Berger & Baylies.

East Seventeenth St., No. 428, five-st'y brick tenement, tin roof; cost, $15,000; owner, John Kehoe, 522 East Eighteenth St.; architect, F. W. Klemt; builders, S. Niewenhaus and Chas. Lehmann.

One Hundred and Forty-fourth St., n s, 570′ e Willis Ave., two-st'y frame dwell., tin roof; cost, $3,500; owner, Jas. S. Bryant, 715 East One Hundred and Forty-fourth St.; architect, H. S. Baker.

Fourth Ave., n e cor. Fifty-eighth St., three-st'y brick stable, gravel roof; cost, $10,000; lessee, James A. Flack, 425 East Fifty-seventh St.; architect, A. B. Ogden.

East Forty-fifth St., No. 240, one-st'y and basement synagogue, tin roof; cost, $12,000; owners, the Societé Communante, Israelite Francaise, Samuel Ulmar, President, s w cor. Ave. B and Fourth St.; architect, Wm. Graul.

Sixty-first St., n s, 200′ e Tenth Ave., five-st'y brownstone front flat, tin roof; cost, $24,000; owner, Margaret Corrigan, 884 Tenth Ave.; architect, C. F. Ridder, Jr.

Courtland Ave., w s, 22′ n One Hundred and Fifty-eighth St., three-st'y frame tenement, tin roof; cost, $4,500; owner, Geo. W. Siemon, 634 Ninth Ave.; architect, C. F. Ridder, Jr.

Forty-eighth St., s s, 100′ e Tenth Ave., 5 five-st'y brownstone front tenements, tin roofs; cost, each, $13,000; owner, John Livingston, 981 Lexington Ave.

Eightieth St., s s, 250′ w Third Ave., five-st'y brownstone front flat, tin roof; cost, $18,500; owner, August Schwarzler, 401 West Forty-first St.; architect, John Brandt.

Philadelphia.

PLUMBING ORDINANCE. — The plumbers and architects have united to secure proper sanitary plumbing. At the meeting of a special committee, the Chief Engineer submitted an ordinance he had prepared, which contained a series of rules to secure good material and workmanship, and other important matter relating to how the purpose desired could be accomplished.

BUILDING PERMITS. — *Alder St.*, s of Girard Ave., three-st'y dwell., 16′ x 30′; N. S. Brown, owner.

Federal St., No. 1635, front alterations and two-st'y building, 12′ x 30′; L. J. Lynch, owner.

Chestnut St., Nos. 920 *and* 922, front and interior alterations; J. H. Errickson, contractor.

Gaskill St., No. 205, three-st'y dwell., 19′ x 23′; Mrs. J. McMullen, owner.

Janney St., cor. Venango St., two-st'y dwell., 16′ x 18′; Taylor Brown, owner.

Berks St., s w cor. Twenty-third St., church-building, 56′ x 176′; cost, about $40,000; E. F. Durang, architect.

Chestnut St., Nos. 1307 *and* 1309, two interior alterations; Jno. Wanamaker, owner.

Manayunk Ave., s s, e of Cedar St., three-st'y dwell., 18′ x 47′; Jas. H. Boone, owner.

Ward St., e s, s of Wharton St., two-st'y dwell., 16′ x 38′; M. Kennedy.

Warner St., n w cor. Ezekiel St., two-st'y stable, 25′ x 25′; M. L. Shur, owner.

Sixth St., e s, and n of Indiana Ave., 6 two-st'y dwells., 14′ x 43′; J. S. Kelly, owner.

North Fifth St., No. 1823, two-st'y shop, 20′ x 50′; R. M. Martin, contractor.

Nineteenth St., e s, s of Wharton St., 2 dwells., 17′ x 65′; Thos. Marshall.

Ward St., e s, s of Wharton St., dwell., 16′ x 28′; L. P. Simpson.

Moore St., s s, between Fourth and Fifth Sts., 8 three-st'y dwells., 16′ x 45′; A. M. Green, owner.

Eustis St., n s, between Fourth and Fifth Sts., 2 two-st'y dwells., 15′ x 30′; A. M. Green, owner.

Reed St., s s, n s cor. Garrett St., between Eighteenth and Nineteenth Sts., 4 two-st'y dwells., 16′ x 42′; Wm. Stuckey, contractor.

Third St., e s, s of Buttonwood St., two-st'y brewery, 18′ x 20′; Chas. Beitenmiller, contractor.

St. Louis.

BUILDING PERMITS. — Thirty-seven permits have been issued since our last report, of which sixteen are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

Henry Ganss & Son, addition to four-st'y planing-mill; cost, $4,500; contract sub-let.

Lo. Moser, four-st'y hotel; cost, $50,000; McElpatrick & Son, architects; contract sub-let.

Duccan Parker Hardware Co., two-st'y iron-clad; cost, $8,000; contract sub-let.

Jacob Mertz, two-st'y brick dwell.; cost, $3,200; Wm. Gahl, contractor.

Thos. Flannery, two-st'y brick dwell.; cost, $4,500; Jos. Flannery, contractor.

Fehlig Bros., two-st'y brick box factory; cost, $3,000; Babor & Co., contractors.

Henry Stussel, two-st'y brick dwell.; cost, $5,000; Louis Yaeger, contractor.

W. Patterson, 2 two-st'y brick dwells.; cost, $10,000; Thos. Gugerty, contractor.

PROPOSALS.

STEAM PROPELLER FOR THE QUARTERMASTER'S DEPARTMENT.

[At New York, N. Y.]

DEPOT QUARTERMASTER'S OFFICE,
CORNER HOUSTON AND GREENE STS.,
NEW YORK CITY, February 5, 1883.

Sealed proposals, in triplicate, with a copy of this advertisement attached to each, are invited, and will be received at this office **until 12 M., March 7, 1883,** at which time they will be opened in the presence of bidders, for the construction of a steam propeller for the United States Quartermaster's Department, for service at Fort Monroe, Virginia. Bids are invited to be made for the vessel complete; also for that portion embraced in specifications No. 1, or that in No. 2, or that in No. 3, only, or those portions in any two of them. Plans and specifications of the same, together with all other necessary information, will be furnished to bidders, on application to the Chief Quartermaster on Governor's Island, New York Harbor, the Depot Quartermasters at Washington, Baltimore, Philadelphia, and Boston, the Post Quartermaster at Fort Monroe, Virginia, and at this office. Bids are also invited for the work on the basis of supplying out-board condenser, 6-inch, No. 8 copper, or ¼ brass. Also on the basis of the Government supplying the circulating and air pump, and a condenser of one-half the required capacity, the contractor furnishing the other half and making all connections. In either case, if award is made thereon, the specifications will be changed accordingly. The right is reserved, on the part of the United States, to reject any or all bids. Proposals should be indorsed "Proposals for Construction of Steam Propeller," and addressed to the undersigned.

HENRY C. HODGES,
Deputy Quartermaster-General, United States Army.
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COURT-HOUSE.

[At Caledonia, Minn.]

Sealed proposals will be received by the building committee of the County Commissioners of Houston County, Minnesota, **until March 21, 1883,** at the office of the Auditor, in Caledonia, for the construction of a stone court-house for said county, according to plans and specifications of same now on file at the Auditor's office, and at the office of the architects, C. G. Maybury & Son, Winona, Minn., who will give any further information desired.

No bids will be received except for the whole building complete as specified.

The successful bidder will be required to give bonds in the sum of $5,000.

The right to reject any and all bids is reserved.

By order of Building Committee.

372 E. K. BOVERUD, County Auditor.

PROPOSALS.

SCHOOL-HOUSE. [At Brattleboro, Vt.]

BRATTLEBORO, Vt., January 19, 1883.

The plans and specifications of a two-st'y brick school-house, 96' x 124', will be open for inspection after January 30, at the office of Haskins & Stoddard, Brattleboro, Vt. Bids for constructing the same in a thorough and substantial manner will be received by the undersigned up to 12 M., **February 20, 1883.** Bids may be made for building the house as a whole, or in parts, to wit: For the basement or foundation story, with necessary excavations; for the mason-work, for carpenter-work and painting; for heating and plumbing. The successful contractor will be required to give sufficient bonds to insure a faithful compliance with their contract. The committee reserve the right to reject any or all bids as they may deem best for the interest of the district.

H. D. HOLTON,
WM. H. COLLINS,
E. W. STODDARD,
JACOB ESTEY,
GEO. A. HINES.
} Building Committee.

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IRON FURRING AND LATHING, ALSO FIRE-PROOF COVERING FOR IRON COLUMNS. [At Topeka, Kans.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., February 1, 1883.

Sealed proposals will be received at this office **until 12 M., on the 24th day of February, 1883,** for furnishing and fixing in place, complete, all the iron furring and lathing, also the fire-proof covering for the iron columns, required for the Court-House and Post-Office at Topeka, Kansas, in accordance with drawings and specifications, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

JAS. G. HILL,
372 Supervising Architect.

MOVABLE DAM. [At Louisville, Ky.]

U. S. ENGINEER OFFICE, 82 WEST THIRD ST.,
CINCINNATI, O., January 12, 1883.

Sealed proposals in duplicate will be received at this office, **until 12 o'clock, noon, on Thursday, the 1st day of March, 1883,** for the construction of the parts necessary for 200 feet of movable dam, and the delivery of the same at Louisville, Ky.

Approximate quantities: Wrought-iron, 28,000 pounds; cast-iron, 2,500 pounds; malleable-iron, 850 pounds; dressed white-pine, 1,260 feet, B. M.; dressed white-oak, 400 feet, B. M.

Specifications and all necessary information can be obtained by application to the undersigned.

WM. E. MERRILL,
374 Major of Engineers.

PROPOSALS.

COUNTY COURT-HOUSE. [At Mount Ayr, Io.]

Drawings can be seen after February 10th at the office of the County Auditor, at Mt. Ayr, Ringgold Co., Iowa, or at the office of Eckel & Maun, architects, St. Joseph, Mo.

Sealed bids must be in by **March 1, 1883.**

The Supervisors reserve the right to reject any or all bids.

By order of the Board.

T. A. STEVENSON, Chairman.
J. E. DOZE, County Auditor. 373

MASONRY AND GRADING. [Near Blackstone, Mass.]

NEW YORK & NEW ENGLAND RAILROAD CO.
ENGINEER'S OFFICE,
224 FEDERAL ST., Boston, February 3, 1883.

Sealed proposals will be received at this office **until Thursday, February 15,** for doing the grading and building the masonry necessary for a second track between Blackstone, Mass., and the east switch at Andover, Ct., 58 3-10 miles; for further information apply at this office.

L. B. BIDWELL,
372 Chief Engineer.

DAM. [At Louisville, Ky.]

U. S. ENGINEER OFFICE, 82 WEST THIRD ST.,
CINCINNATI, O., January 12, 1883.

Sealed proposals, in duplicate, will be received at this office **until 12 o'clock, noon, on Thursday, the 1st day of March, 1883,** for the construction of the parts necessary for 200 ft. of movable dam, and the delivery of the same at Louisville, Ky.

Approximate quantities: wrought-iron, 28,000 lbs.; cast-iron, 2,500 lbs.; malleable iron, 850 lbs.; dressed white-pine, 1,260 feet B. M.; dressed white-oak, 400 feet, B. M.

Specifications and all necessary information can be obtained by application to the undersigned.

374 WM. E. MERRILL, Maj. of Engineers.

COURT-HOUSE. [At Caledonia, Minn.]

Sealed proposals will be received by the Building Committee of the County Commissioners of Houston County, Minnesota, **until March 21, 1883,** at the office of the Auditor in Caledonia, for the construction of a stone Court-House for said County, according to plans and specifications of same now on file at the Auditor's Office, and at the office of the architects, C. G. Maybury & Son, Winona, Minn., who will give any further information desired. No bids will be received except for the whole building complete as specified. The successful bidder will be required to give bonds in the sum of $5,000. The right to reject any and all bids is reserved. By order of Building Committee.

376 E. K. BOVERUD, County Auditor.

PROPOSALS.

WATER-WORKS. [At Gloucester, N. J.]

GLOUCESTER CITY, January 27, 1883.

Sealed proposals in writing will be received by "The Mayor and Common Council of Gloucester City, New Jersey," at their usual place of meeting at the City Hall in said City, **up to 8 o'clock of the evening of February 13, 1883,** for furnishing material and labor for constructing a water-works for said city under and by virtue of an act entitled "An act to enable cities to supply the inhabitants thereof with pure and wholesome water," approved April 21st, 1876, and the supplement thereto approved March 9th, 1877, and also under and by virtue of an ordinance entitled "An ordinance for the construction of Water-Works for Gloucester City, for the appointment of a civil engineer to superintend the construction thereof, and for the issuing of bonds for the payment of the same." Passed by Common Council of Gloucester City, August 3, 1882.

Bids for the pipe system complete to state the price per foot for furnishing all material, pipes, hydrants, stops, etc., and laying same. Each bidder must accompany his bid with a certificate that he has deposited three hundred ($300) dollars with the City Treasurer. The sum thus deposited to be forfeited to the city should the successful bidder refuse or neglect to enter into contract within ten (10) days from the time of such contract being awarded to him. The money to be returned to the unsuccessful bidder as soon as the contract is awarded. The successful bidder will be required to give satisfactory security for the faithful performance of his contract in the sum of fifty (50) per cent of the value of his contract, with at least two sureties to be approved by the Mayor and Common Council of Gloucester City, New Jersey.

Plans and specifications may be seen at the Mayor's office in Gloucester City, or at the office of the engineer, 144 South Fourth St., Philadelphia, Pa. The Mayor and Common Council of Gloucester City, New Jersey, reserve the right of rejecting any and all bids.

WILLIAM R. TAYLOR, Recorder,
ROBERT CONWAY, Pres. of Common Council.
372

HARDWARE. [At Philadelphia, Pa.]

OFFICE OF SUPERVISING ARCHITECT,
TREASURY DEPARTMENT,
WASHINGTON, D. C., February 5, 1883.

Sealed proposals will be received at this office **until 12 M., on the 26th day of February, 1883,** for furnishing and delivering at the Treasury Building, Washington, D. C., all the hardware required for the Court-House and Post-Office at Philadelphia, Pa., in accordance with specification and schedule, copies of which and any additional information may be had on application at this office or the office of the Superintendent.

JAS. G. HILL,
373 Supervising Architect.

Classified Advertisements.

ARCHITECTS (LANDSCAPE). PAGE.
Henry A. May, Boston vi
Adams & Muzzey, Boston vi

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A. L. Barber, Washington xvi
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T. M. Clark, Glens Falls, N. Y. xv
Excelsior Brick and Stone Co., Phila. xiv
T. R. Keator & Co., New York xiv
N. E. Press Brick M'f'g Co. xiv
Peerless Brick Co., Philadelphia xiv
Rowe & Denman, New York xv
Waldo Bros., Boston xv

BOILERS (COPPER).
Brown & Brothers, New York xiii

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CEMENT.
James Brand, New York xv
Brooks, Shoobridge & Co., New York vii
Howard Fleming, New York viii
Gabriel & Schall, New York xiv
Gustav Grawitz xv
Johnson & Wilson, New York xvi
T. R. Keator & Co., New York xv
Sherman, Weeks & Co., New York xvi

CHAIR-SEATING (PERFORATED).
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Harwood Chair-Seat Co., Boston xiv

CLOCKS FOR PUBLIC BUILDINGS.
Ansonia Clock Co., New York and Boston iii
E. Howard Watch & Clock Co., Boston ii
Seth Thomas, Thomaston, Conn. iii

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French, Richards & Co., Philadelphia vii

CONDUCTORS (WATER).
Austin, Obdyke & Co., Philadelphia ii
Boston Spiral Tube Works, Boston ii
Solderless Standing-Seam Conductor Co., Allegheny, Pa. ii

COPPERSMITHS AND METAL-WORKERS.
G. L. Swett & Co., Boston vii

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DECORATIVE LEATHER.
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DECORATORS.
P. M. Aimini, Chicago iii
Dept. of Associated Artists, New York i
Fox, Brusselars & Co., Hartford, Conn iii
Wm. Healy & Son, Bridgeport, Conn. iii
W. J. McPherson, Boston iii
Arthur Noble, Boston, Mass. iii
Frank Hill Smith, Boston iii

DOOR-HANGERS.
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E. C. Stearns & Co., Syracuse, N. Y. vi

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S. W. Fuller, Boston ii

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James Bates, Baltimore, Md. vii
Clem & Morse, Philadelphia vii
Crane Brothers M'f'g Co., Chicago vii
George F. Gelbach, Philadelphia v
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C. H. Mitchell & Co., Chicago v
Moore & Wyman, Boston i
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Wm. S. Richards & Co., Philadelphia vii
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Arthur E. Rendle, New York viii

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Kinsella & Haywood, Chicago iii
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J. B. & J. M. Cornell, New York ii
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